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MANUFACTURE AND DELIVERY OF COMPOSITE MOTOR CASES. VOLUME II

Roger J. Dale

Hercules, Incorporated

Prepared for:

Army Missile Command

April 1973

AD

HERCULES INCORPORATED
ALLEGANY BALLISTICS LABORATORY
CUMBERLAND, MARYLAND

AO-255-135-01-012

MANUFACTURE AND DELIVERY OF COMPOSITE MOTOR CASES

VOLUME II

FINAL TECHNICAL REPORT

ROGER J. DALE

SPONSORED BY

U. S. ARMY MISSILE COMMAND
RESEARCH, DEVELOPMENT, ENGINEERING AND
MISSILE SYSTEMS LABORATORY
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REDSTONE ARSENAL, ALABAMA

CONTRACT DAAH01-72-C-0829

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13. ABSTRACT

This report covers the design, fabrication, experimental design verification, manufacture and delivery of 20 fiberglass and 20 PRD-49 Type III three-inch diameter composite rocket motor cases for application to SMAWT (Short Range Man Portable Anti-Tank Weapons Technology). Both motor case designs had open aft ends to permit propellant to be cast and case bonded to the case wall or the insertion and bonding of a cartridge-loaded grain.

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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Composite rocket motor cases						
Filament-winding						
PRD-49 fiber						
S904 fiberglass						
SMAWT (Short Range Man Portable Anti-Tank Weapons Technology)						

APPENDIX B

ADVANCED MATERIAL DESIGN DISCLOSURE

B-1. Design Calculations

B-2. Case Sketches

B-3. Tooling Sketches

B-4. Manufacturing and Inspection Records

APPENDIX B-1

DESIGN CALCULATIONS

PREPARED BY: T. White	HERCULES INCORPORATED	PAGE NO 1 OF
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TITLE: Composite Motor Case - PRD Configuration

Design Parameters

$b_w = .156$

$P_{design} = 11,400$ psi

$\frac{P_{design}}{1.5} = 7600$ psi

$R_i = 1.367$ in.

$r_t = .961$ in.

$A_t = 2.9013$ in.^{2}

$r_{exit} = 1.473$ in

$A_{exit} = 6.818$ in

$\epsilon = 2.35$

$\alpha = 15°$

For $\gamma = 1.14$

sea level conditions

$C_F = 1.4778$

Thrust = 32,585 lb @ P = 1600

Forward Dome

Revise $\alpha = 17.7°$

2.7 circuits/layer

Centerport Opening - 1½ NPT

$r_{rev.} = .24 + 12$

$r_{rev} = .36$

$R_{eqtv} = 1.390$

$\sin \alpha = \frac{.36}{1.39} = .2590$

$\alpha = 15°$

HER. 1659) REV. 1-71 100 PADS   A-6018 (9-68)

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for $\alpha = 15°$

$\sin^2\alpha = .0670$

$\cos^2\alpha = .9330$

$\tan^2\alpha = .0718 \qquad 1 - \frac{1}{2}\tan^2\alpha = .9641$

$N_\phi = 7792 = n_\alpha\,(685 \times 10^{-5})(2.88 \ldots)(.933)$

$= 1972.5\,(.933)\,n_\alpha$

$= 1840.6\,n_\alpha$

$n_\alpha = 4.23$ layer

Assume 4 helical layers in forward dome; $f_\alpha = 304,360$

For static firing

Thrust = 38,200

J = .70

For hydrotest

$J = \frac{3.113}{6.07} = .478$

1 − J .522

$N_{\phi\,cyl.} = .522(7792) = 4067$ lb/in

Assume $n_\alpha = 3.0$ layers

Helical layers required in cyl. section: $f_\alpha = 212,121$

$n_\alpha = \frac{\ldots(4.23)}{\ldots} = \ldots$ layers

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Hoop layers required

For $n_\phi = 3.0$ and hydrotest condition $n_\phi N T_{\phi \sin^2 \alpha} = 292$

$$n_\theta = \frac{N_\theta}{N_{\phi_0} T_0} \left(1 - \tfrac{1}{2} \tan^2 \alpha\right)$$

$N_\theta = pR = 11400(1.39)$

$= 15,846$

$N_{\phi_0} T_0 = .00685(320,000)$

$= 2192$

$n_\theta = \frac{15,846(.9641)}{2192}$ $\qquad$ $n_\theta = \frac{15846 - 292}{2192}$

$n_\theta = 6.97$ layers $\qquad$ $n_{\theta_{req'd}} = 7.10$ layers

Assume $n_\theta = 7.0$ layers @ 90°

In cylindrical section:

3 layers @ ±30° $\qquad$ $t_\alpha = .036$

7 layers @ 90° $\qquad$ $t_\theta = .070$

$t_c = .106$

$\bar{R} = 1.3674.053$

$= 1.420$

In cylinder

$R_o = 1.3677.106$

$= 1.473$ in.

O.D. $= 2.946$ in.

max $P_o = \frac{3.150}{2} = 1.575$

$\epsilon_{max} = 1.575 \cdot 1.96$

$= .208$ in.

Nozzle Retention.

During hydrotest:

$F_{44\ nozzle} = 11,400\ \pi\ (1.869 - .923)$

$= 35,814\ (.946)$

$= 33,880$ lb. $\quad circ_{ml} = 8.559$ in.

$F_{lin} = \frac{33,880}{8.559} = 3944$ lb/in

Using a steel retaining ring

$S_{allow} = 95,000$

$\epsilon_{steel} = \frac{3944}{95,000} = .042$ in

For bearing strength = 90,000 psi in composite

$\Delta R_{req'd} = \frac{3,984}{40,100} = .099$ in.

using 36 – .125 in dia. pins.

$A_{pin} = .01227 in^2$

for 36 pins

$A_{Total} = 36(.01227)$

$= .4417 in^2$

$\tau = \frac{33,880}{.4417} = 76,704$ psi

in bearing

$A_{br} = .125(.20)$

$= .025$

Total $A_{br} = 36(.025)$

$= .9 in^2$

$36(.125) = 4.50$ in.

circ. = 8.589

spacing $= \frac{8.589 - 4.5}{36} = .114$ in.

$\sigma_{br_{comp}} = \frac{33,880}{.9} = 37,644$ psi.

Tension in cap[illegible] between pins

$\sigma_T = \frac{33,880}{4.089(.2)} = \frac{33,880}{.8178} = 41,428$ psi

---

Force on Forward Shirt

During hydrotest,

$F = 11,400(2.9013) = 33,075$ lb.

During static firing;

$F = 1.5(32,300) = 48,450$

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$2\pi\bar{R} \simeq 9.217$ 7.324

$F/_{in} = 3581\ lb/in$ Hydrotest 3447 = 19,487

$= 5256\ lb/in$ Static Firing $K_s = 1.57$

For $F_c = 39000$
$t = .175$

Winding Sequence

X O M O X OO X OOO

Forward Dome Contour

$R_c = 1.367$ in

$t_d = .048$ in. (including mat) $Z = \frac{.048}{2.782} = .01725$

$\bar{R}_{dome} = 1.391$ in.

$\alpha = 15.0$

X	y	t'	$\bar{R}$	Y	$t_{d/2}$
1.0	0	4.00	1.3910	0	.024
.94	.24311	4.276	1.3075	.3382	.0257
.88	.33528	4.574	1.2241	.4664	.0276
.82	.40415	4.966	1.1406	.5566	.0298
.76	.4499	5.417	1.0572	.6259	.0324
.70	.48942	5.941	.9737	.6808	.0356
.64	.52129	6.601	.8902	.7251	.0396
.58	.54712	7.444	.8068	.7613	.0447
.52	.56803	8.567	.7233	.7901	.0514
.46	.58489	10.160	.6399	.8136	.0610
.40	.59843	12.665	.5564	.8324	.0760
.34	.60940	17.524	.4729	.8477	.1051
.3117	.61457	21.766	.4328	.8542	.1342

R_c	Y	t
1.367	0	
1.360	.1	
1.336	.2	
1.275	.3	
1.237	.4	.055
1.158	.5	.058
1.039	.6	.066
.848	.7	.082
.710	.74	.104
.520	.76	.200
.228	.764	.300

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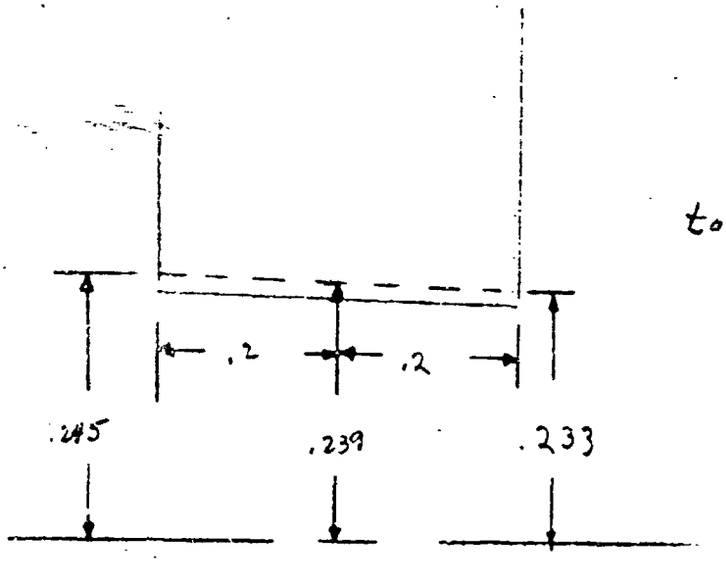
Forward plug thread strength

$F_{plug} = 11{,}400 \pi (.2609)^2$

$= 11{,}400 (.2138)$

$F = 2{,}437\ 16.$



$\tan\phi = \frac{.245 - .239}{.2}$

$= \frac{.006}{.2}$

$= .0300$

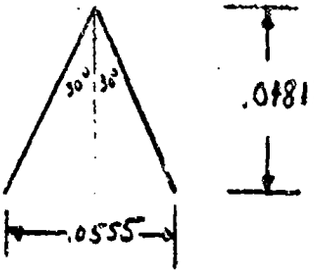
$\phi = 1°43'$

for 18 threads/inch

1 thread = .0555 in

F-G = .2387 - .2165

= .0222



$\tan 30° = \frac{X}{.04811}$

$X = .04811 (.57735)$

$= .02778$

$2X = .0555$

Assume $\bar{R} = .237$

$2\pi\bar{R} = 1.489$

for $t = .300$ in

No. threads = $\frac{.300}{.0555} = 5.40$ threads

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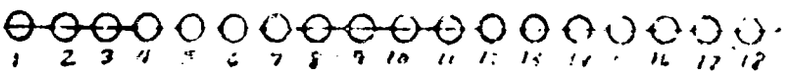
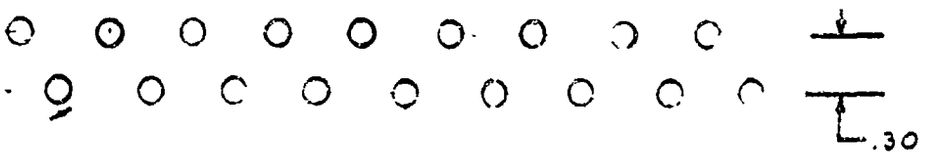
$A_{shear} = 1.414\,(5.4)(.024)$

$= .193$

$S = \frac{2437}{.193} = 12{,}627$ psi

Pin Spacing

single row 

double row 

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Weight Estimate

Forward Dome: $\alpha = 15^\circ$ $t = .01725$

Shell Vol. $= .275 \times \frac{.01725}{.02} (1.97)^3 \pi (.338)(.194 \times .27)$

$= .2372 (2.692) + 2.124 (.0524)$

$= .6385 + .1113$

Shell Vol. $= .7498$

for $\rho_c = .048$ lb/in^3

$Wt_{dome} = .75 (.048)$

$wt_{dome} = .036$ lb.

Basic Cylinder:

$\ell = 6.86$

$t = .106$

$\bar{R} = 1.367 + .053$

$= 1.42$

$2\pi\bar{R} = 8.922$

$Vol_{shell} = 2\pi\bar{R}\, t\, \ell$

$= 8.922 (.106)(6.86) = 6.488$

$wt. = 6.488 (.048) = .311$ lb.

Aft Skirt $t = .102$

$\bar{R} = 1.525 - .051 = 1.524$

$wt = 9.576 (.1425)(.041) = .066$ lb.

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Fwd skirt. $t = .175$

$32.1 \cdot 1.217$

$\ell = 1.94$

$wt = 9.217 (.37)(.64)$

$= .15015.$

$wt_{PRD\,comp.} = .036 + .311 + .0664 + .150$

$= .56316.$

wt of pins (4)

$A_{pin} = .01227$

$\ell_{pin} = .42$

$Vol_{pin} = .00515$

for 36 pins = .1554

$wt_{pins} = .185 \times .284 = .05316.$

$wt_{nozzle} = .275$ lb.

Comp.	Wt.-lb.
chamber	.563
nozzle	.275
pins	.185
	1.0238 lb.

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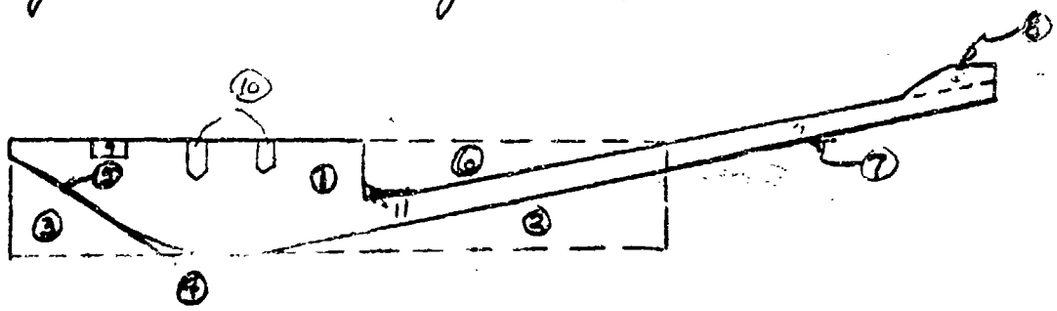
Weight Estimate for Fiberglass Nozzle



Section	R_i	R_o	b	h	$\bar{R}$	A	$\bar{R}A$	wt.
1	.961	1.3655	2.427	.4045	1.16325	.98172	+1.1420	+.5023
2	.961	1.320	1.411	.359	1.0807	−.25327	−.2737	−.1204
3	.961	1.340	.53	.379	1.0873	−.10044	−.1092	−.0480
4	—	—	.316	.054	.987	−.00853	−.0084	−.0037
5	—	—	.28	.012	1.260	−.00168	−.0021	−.0009
6	—	1.3655	1.027	.256	1.2802	−.13146	−.1683	−.0740
7	—	—	.592	.048	1.424	+.0284	+.0404	+.0178
8			.336	.092	1.520	+.0309	+.0470	+.0207
9	1.2455	1.3655	.235	.120	1.3055	−.02820	−.0368	−.0162
10	—	—	—	—	—	—	—	−.0083
11	—	—	.270	.044	1.172	+.0119	+.0139	+.0061
								+.2754

Assume $\rho = .070$

$2\pi\rho = .439824$

(36) holes: dia = .125

depth = .268

$Vol_{hole} = \pi(.125)^2(.268)$

$= .2105(.0156)$

$= .003284$

$wt_{36\ holes} = 36(.07)(.003284)$

$= .0083$

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SMAWT PRD Case Stresses

Centerport Plug Retention - PRD threaded joint

@ p = 11,400 psi

F = 2,437 lb.

Assuming:

5.40 threads engaged (.300 in. thick boss)

effective thread width = .024 in. (mean thread thk.)

f = 12,627 psi.

Forward Skirt:

Ultimate Compressive load

Hydrotest: F = -33,075 lb. F/in = 358.8 lb/in

Static Firing: F = -48,450 lb F/in = 525.6 lb/in

Skirt thickness = 0.182 in.

Ultimate Compressive Stress

Hydrotest: f = 19,714 psi M.S. = +.5

Static Firing: f = 28,879 psi M.S. = +.04

Ultimate Average Shear Stress at Joint

l_{shear} = 1.4 in.

Hydrotest: f = 2,563 psi

Static Firing: f = 3,758 psi

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Nozzle to Chamber Joint: 36 - 1/4" pins.

Ult. Axial Force:

During Hydrotest: F = 35,880 lb F/in = 3,944 lb/in

Static Firing: F = 24,878 lb F/in = 2,896 lb/in

Bearing Stress During Ultimate Hydrotest:

in Chamber: σ_{br} = 37,644 psi

in Nozzle: σ_{br} ≅ 37,644 psi

Tensile stress in chamber between pins:

σ_T = 41,428 psi.

Shear stress in pins (average)

σ = 76,704 psi.

Case-in-case Design

Adhesive Shear Stresses

Ave. σ = 1,332 psi

Fwd edge Peak σ = 12,432 psi (K = 9.3)

Aft edge peak σ = 1,664 psi (K = 2.0)

HER. 18581 REV. 1-71 100 PADS A-8019 (5-66)

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LAW PRC Case Design Change

Failure of the joint initiated at p [illegible]

Total failure @ p = 8535 psi

Force on nozzle during hydrotest:

$$F = p\pi\left[(1.367)^2 - (.761)^2\right]$$

$= 11,[illegible] (1.869 - .923)$

$= 114[illegible] (2.97[illegible])$

F = 33,[illegible] lb. @ ultimate pressure

Using 36 [illegible] pins [illegible] pin = .5[illegible]

F/pin = [illegible] lbs.

dia. pin = .165

Basic pressure vessel geometry.

7 layers [illegible]° } t = .106 in.
3 layers [illegible] 17.7°

Additional [illegible]
[illegible] layers [illegible] } t = .102
[illegible] layers @ [illegible]°
[illegible] in.

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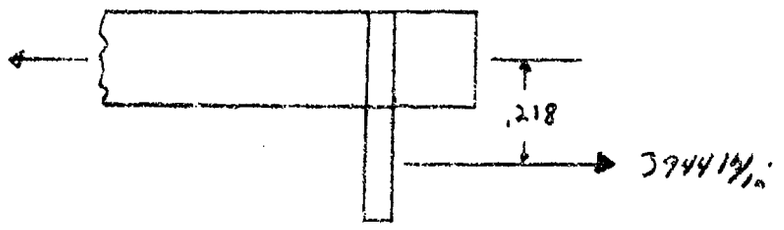
for $t = .208$

$F = 23,000$ lb capability on uniaxial test

$A_{br} = .125(.208) = .026$

$\sigma_{br} = \frac{941.14}{.026} = 36,198$ psi.

$\sigma_{grip\ pc} = \frac{23000}{2.972} = 7,402$ psi



$M = 3944(.218) = 860$ in lb/in

$f_t = \frac{6M}{t^2} = \frac{6(860)}{(.208)^2} = \frac{5160}{.043264} = 119,268$ psi

Allowable Compressive Strengths

all gloss cloth	31,000
all 90° windings:	21,000
all 15° windings:	54,000

Shirt $R_o = 1.575$

$R = 1.575 - .104 = 1471$

$2\pi R = 9.243$

for 18 - .125 dia pins $w = 2.25$

eff circ. $= 9.243 - 2.25 = 6.993$ in

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Tensile stress between pins

$$\sigma = \frac{F}{t \times w} = \frac{338.1}{.203\,(6.993)} \cdot \frac{23{,}851}{1.454}$$

$$\sigma_T = 23{,}[illegible] \text{ psi}$$

Recommend substituting [illegible] S 34-901 glass cloth in place of PRD cloth in ratio's (with [illegible] in axial direction)

1 layer cloth to [illegible] hoop layer

2 layers cloth to one hoop layer

For design 1 [illegible]

at fwd end:	X O X O X O X O	[illegible] C H C H C H C H	C O C O [illegible] C O
at aft end:	X O X O X O X O	———	C O C O [illegible] O C O

For design 2

at fwd end	X X O X O X O	[illegible]	C C O C C O C C O
at aft end	X O X O X O X O	———	C C O C C O C C O

Wind sufficient material to assure machined diameter of [illegible] at fwd and aft ends.

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TITLE: LAWII - Nozzle for PRD Case

Nozzle Composite Thickness Estimate

at aft equator; $K_i' = 1.432$

$n_\alpha = 4.0$ layers @ 42°

$t_\alpha = .046$

$\bar{R}_{eqtr} = 1.432 + .023$

$= 1.455$

$\bar{R} \sin\alpha = 1.455(.66913) = .97358$

$+\bar{R}\cos\alpha = 1.455(.74314)(.046) = .0497$

at throat; $K_i' = .961$

$\alpha = 65°$

$$t = \frac{.046(1.432)(.74314)}{.961(.4226)} = \frac{.0490}{.4061}$$

$t = .1207$

$\bar{R} = .961 + .06 = 1.021$

$$t = \frac{.049}{.9315} = .114$$

$\bar{R} = .961 + .057 = 1.018$

$$t = \frac{.049}{.4302} = .114$$

$\sin\alpha_{prod} = \frac{.972}{1.018} = .9564$

$\alpha_{prod} = 73°21'$

HER. 19581

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At equator $\bar{R} = 1.455$ $\bar{R}\cos 42° = 1.0815$

$R_i = 1.432$ $\bar{R}\sin 42° = .7736$

$t = .046$

At throat $\bar{R} = 1.018$ $\bar{R}\cos 65° = .4302$

$R_i = .961$ $\bar{R}\sin 65° = .9226$

$t = .114$

$\bar{R}$	$\frac{\bar{R}}{R_{eq'r}}$	$\frac{R_i \sin\alpha_i}{\bar{R}}$	α_{gain}	1.455 − $\bar{R}$	δ	δ	α_{actual}
1.018	.6997	.4564	73°2′	.437	8.033°	8°2′	65°
1.050	.7216	.9272	68°	.405	7.445	7°27′	60°33′
1.10	.7560	.8851	62°16′	.355	6.526	6°32′	55°44′
1.15	.7904	.8466	57°51′	.305	5.607	5°36′	52°15′
1.20	.8247	.8113	54°13′	.255	4.688	4°41′	49°32′
1.25	.8591	.7787	51°10′	.205	3.769	3°46′	47°24′
1.30	.8935	.7487	48°30′	.155	2.850	2°51′	45°39′
1.35	.9278	.7212	46°7′	.105	1.931	1°56′	44°13′
1.40	.9622	.6959	44°4′	.055	1.011	1°1′	42°57′
1.455	1.0	.6614	41°	0		0	42°

$\bar{R}\sin\alpha_{gain} = R_{eq'r}\sin 42$

$\sin\alpha_{gain} = \frac{R_{eq'r}}{\bar{R}}\sin 42 = \frac{.7736}{\bar{R}}$

$\delta_T = 73°2' - 65°$

$= 5°$

$\Delta R = 1.455 - 1.018 = .437$

$\delta = \frac{1.455 - \bar{R}}{.437} \times 8.033$

$= 18.553(1.455 - \bar{R})$

PREPARED BY: T. White	HERCULES INCORPORATED	PAGE NO. 3 OF
DATE:	CHEMICAL PROPULSION DIVISION	REF. NO.
CHECKED BY:	PLANT:	
TITLE:		

$\bar{R}$	$\cos\alpha$	$\bar{R}\cos\alpha$	t_A	$5\bar{R}$	$5\left(\frac{t_A}{t}\right)$
1.018	.4226	.4302	.1155	5.090	.289
1.050	.4917	.5163	.0963	5.250	.241
1.10	.5630	.6193	.0803	5.50	.201
1.15	.6122	.7040	.0706	5.75	.177
1.20	.649	.7788	.0638	6.00	.160
1.25	.6769	.8461	.0587	6.25	.147
1.30	.6990	.9087	.0547	6.50	.137
1.35	.7167	.9675	.0514	6.75	.129
1.40	.7320	1.0248	.0485	7.00	.121
1.45	.7431	1.0812	.0460	7.275	.115

$$t = \frac{.0497}{\bar{R}\cos\alpha}$$

HER. 18501 REV. 1-71 100 PADS

PREPARED BY: T. White	HERCULES INCORPORATED	PAGE NO. 1 OF
DATE: 8-14-73	SYSTEMS GROUP	REF. NO.
CHECKED BY:	PLANT:	
TITLE:		

LAM II Forward Skirt Analysis

$R_i = 1.417$

$R_o = 1.500$

$t_c = .083$

Geometry: X-X-OO-X-O

$t_d = .035$

$t_o = .045$

$t_c = .083$

$\bar{R} = 1.417 + .042$

$= 1.459$ in

$2\pi\bar{R} = 9.167$ in

$2\pi\bar{R}t = .7609$

$A_T = 2.901$

$A_{piston} = .196$

$A_{Force} = 2.705$ in^2

@ $p = 7000$ psi

$F_{Skirt} = 7000(2.705) \quad 5750(2.705)$

$= 18,935$ lb. $\quad 16,075$

$\sigma_{br} = \frac{18,935}{.7609}$

$= 24,885$ psi $\quad 21,132$

$\epsilon_\phi = \frac{24,885}{1.753 \times 10^6} = .0139 \quad .0109$

for $t_c = .065$

$\bar{R} = 1.449$

$2\pi\bar{R}t = .5918$ in^2

@ $p = 5950$ psi

$\sigma_{comp} = 27,197$ psi

@ $p = 11,400$

$F_{Skirt} = 11,400(2.705) \quad 11,400(2.901)$

$= 30,837$ lb. $\quad 33,071$ lb.

$\sigma_{br} = 40,527$ psi.

PREPARED BY: T. White	HERCULES INCORPORATED	PAGE NO. 2 OF
DATE: 8-14-72	SYSTEMS GROUP	REF. NO.
CHECKED BY:	PLANT:	
TITLE:		

Rohm & Haas LAW units

$R_i = 1.222$

$R_o = 1.310$

$t_c = .088$

$\bar{R} = 1.222 + .044$

$\bar{R} = 1.266$

$2\pi\bar{R} = 7.955$

$2\pi\bar{R}t = .700$

Static Fire $F_{ult} = 31,890$ lb. $\sigma_{br} = 45,557$ psi.

Hydrotest $A_{piston} = .4418$

@ $p = 13,850$ $F = 6,119$ lb.

@ $p = 20,100$ $F = 8,836$ lb.

$\sigma_{br} = 8,741$ psi

PREPARED BY: T. White	HERCULES INCORPORATED	PAGE NO. 3 OF
DATE: 8-14-72	SYSTEMS GROUP	REF. NO.
CHECKED BY:	PLANT:	

TITLE: LAW II Forward Skirt Analysis

For 3 layers @ 45°

5 layers @ 0°

	$\alpha = 90°$	$\alpha = 42°$	Comp.
n	5	3	8
ϵ	.048	.035	.083
$C_{\theta\theta}$	7.945	3.109	5.617
$C_{\phi\phi}$	1.432	3.070	2.105
$C_{\theta\phi}$	.380	1.820	.961
$C_{\theta z}$	.555	1.939	1.139
ω_r	.24	.28	

$R_i = 1.417$ $\quad E_\theta = 5.156 \times 10^6$

$R = 1.459$ $\quad E_\phi = 1.932 \times 10^6$

$\nu_{\theta\phi} = .469$

$\nu_{\phi\theta} = .176$

$\tau_{cr\ buckling} = 10{,}400$ psi.

Lamina Compressive Strength

0°	173,000
90°	29,000

Bearing Strength for 0°/45°/45°/0° = 53,100 - 60,700

0°/45°/[illegible]°/90° = 61,600 - 63,000

PREPARED BY: T. White	HERCULES INCORPORATED SYSTEMS GROUP	PAGE NO. 4 OF
DATE: 8-15-72		REF. NO.
CHECKED BY:	PLANT:	
TITLE.		

Skirt Modification

$R_i = 1.417$

Assume $t = .065$ in.

Required increase in strength

$\frac{11,400}{7000} = 1.629$

$1.629(.065) = .106$

Add the following to existing skirt:

C O C O C O

$t_{cloth} = .015$ / layer

$t = .045 + .030$

$= .075$

$t_{skirt} = .065 + .075$

$= .140$

$\bar{R} = 1.417 + .07$

$= 1.487$

$\sum t = 1.308$

@ $P = 11,400$

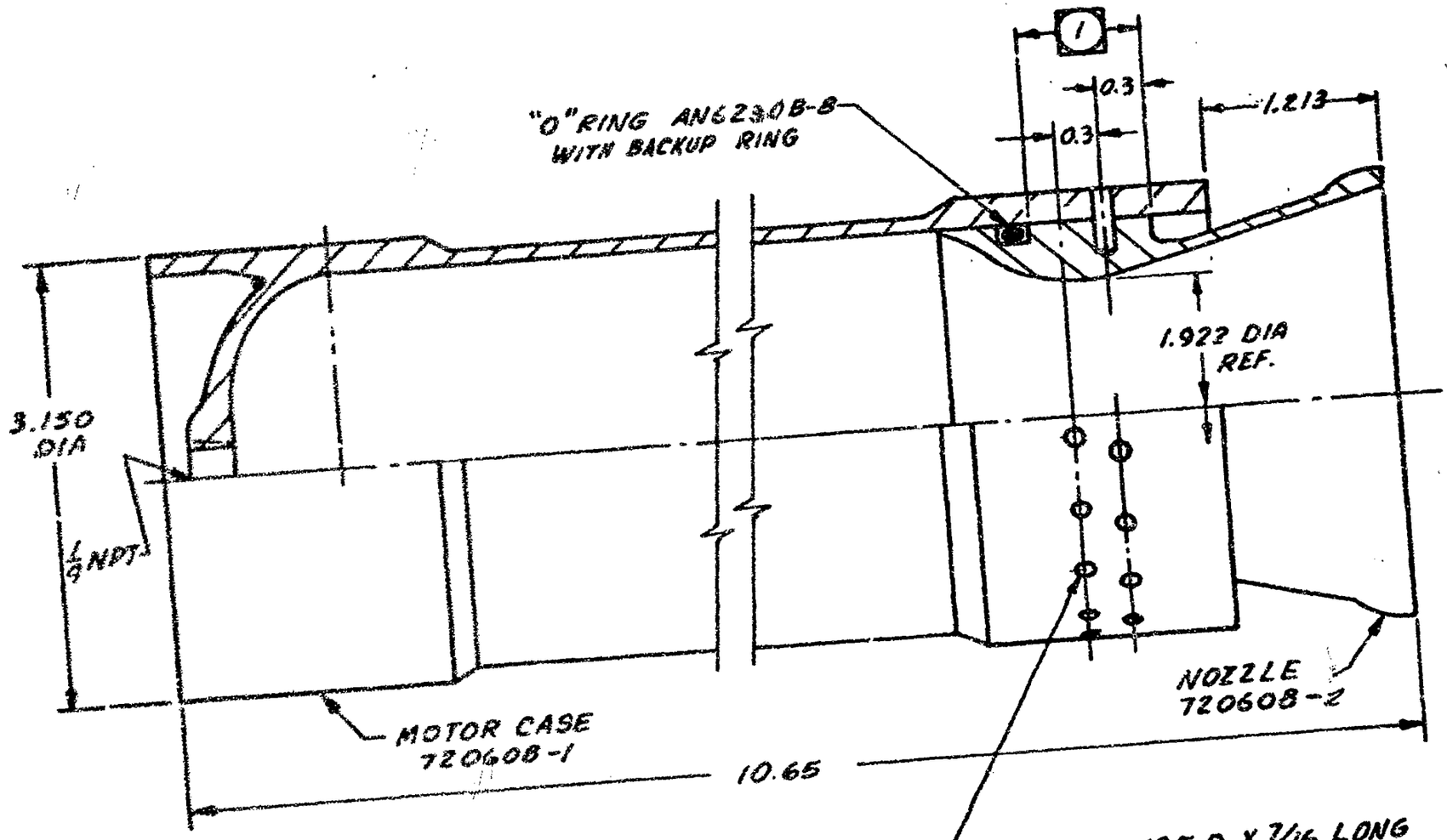
$F = 30,837$ lb.

$\sigma_{comp} = 23,574$ psi

Actual $F = 37,900$ lb in axial compression test

APPENDIX B-2

ADVANCED MATERIAL DESIGN CHAMBER AND NOZZLE



NOTE :

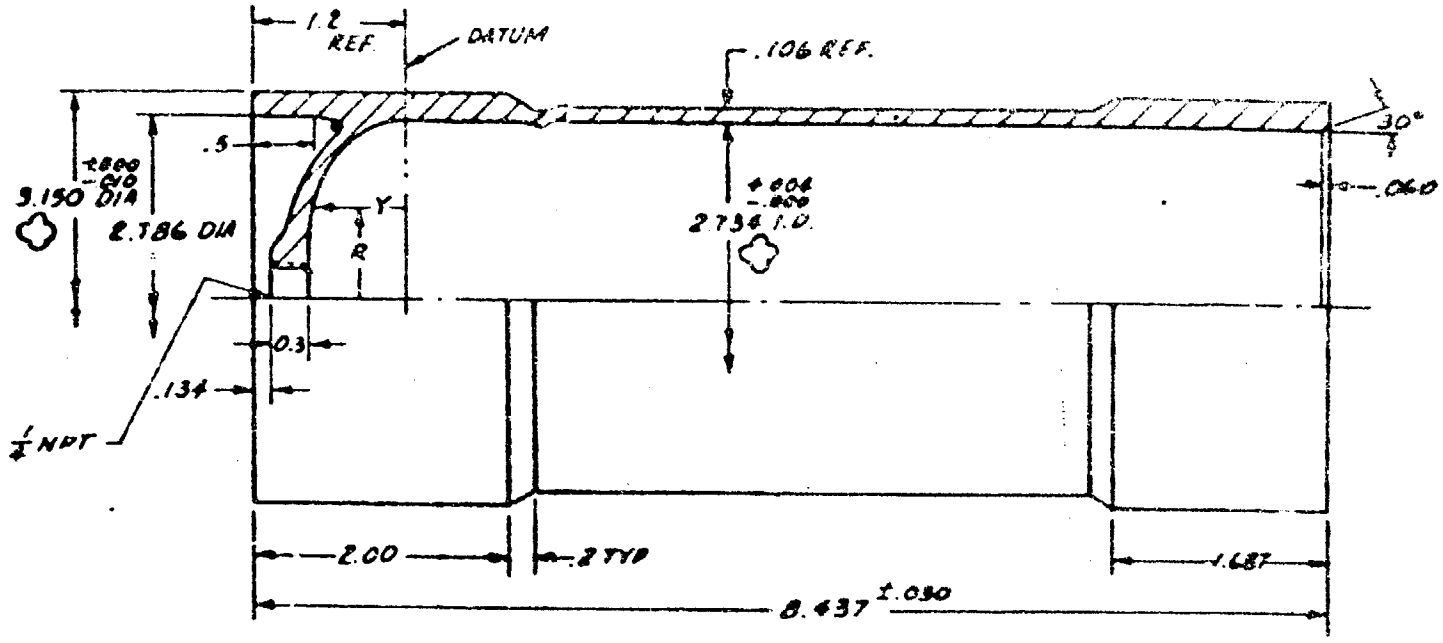
[1] EPON 946, APPLIED TO NOZZLE SURFACE BY BRUSHING

36 PINS - .125 D X 7/16 LONG
2 ROWS STAGGERED 15°, EQUALLY SPACED.

MOTOR ASSEMBLY
1/1 SCALE
720608

DOME COORDINATES

R	Y
1.367	0
1.360	.10
1.336	.20
1.259	.30
1.237	.40
1.158	.50
1.059	.60
.848	.70
.710	.74
.520	.76
.238	.764



NOTES :

1. SYMBOL ✿ INDICATES RESULTS TO BE REPORTED BY FABRICATOR.
2. REPEAT TO ASSURE 3.150 MINIMUM DIAMETER AFTER MACHINING.
3. WINDING SEQUENCE

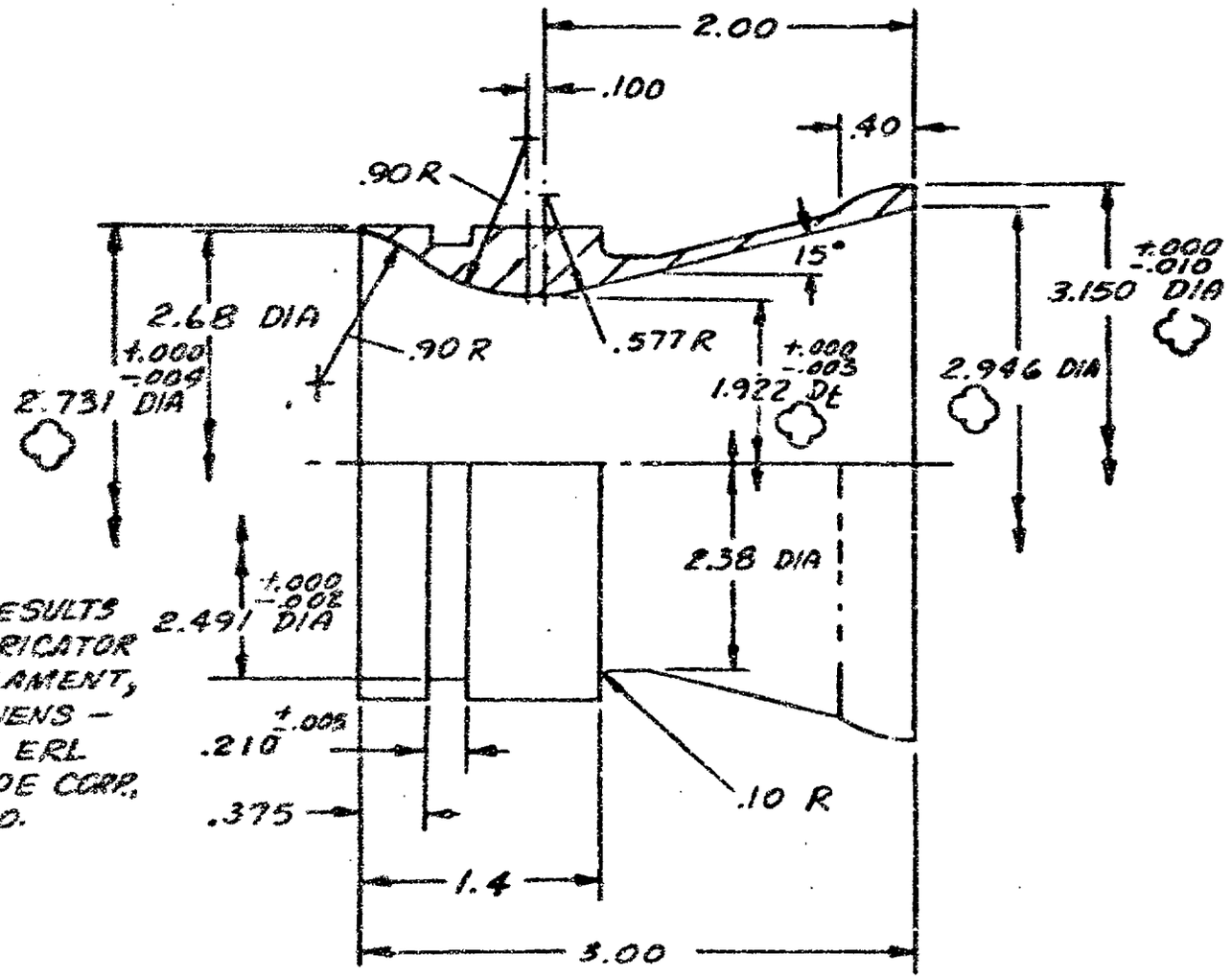
PRESSURE VESSEL	X O X O X X O O O O
FORWARD SKIRT	C H_4 C O C O C O C H{C H} ②
AFT DOUBLER	X O C X O C X O C X O C O C O C O C H{C H} ②

X = HELICAL, 15°
O = HOOP
C = GLASS CLOTH
● = "O" RING
H_4 = FILL WITH HOOP AT O-RING, H = HOOP OVER SKIRT & DOUBLER
MATERIAL : DUPONT PRD-49 TYPE III, 12 END ROVING; ERL 2256 RESIN, UNION CARBIDE CORP., TONOX 6040, UNIROYAL CO.; FIBER GLASS CLOTH, S901-34, OWENS CORNING FIBERGLASS CORP.

MOTOR CASE

½ SCALE

120608



NOTES:

1. SYMBOL ✤ INDICATES RESULTS TO BE REPORTED BY FABRICATOR
2. MATERIAL: FIBERGLAS FILAMENT, 3-90°, .12 END RIVING, OWENS-CORNING FIBEROLAS CORP. ERL 2256 RESIN, UNION CARBIDE CORP. TONOX 6040, UNIROYAL CO.

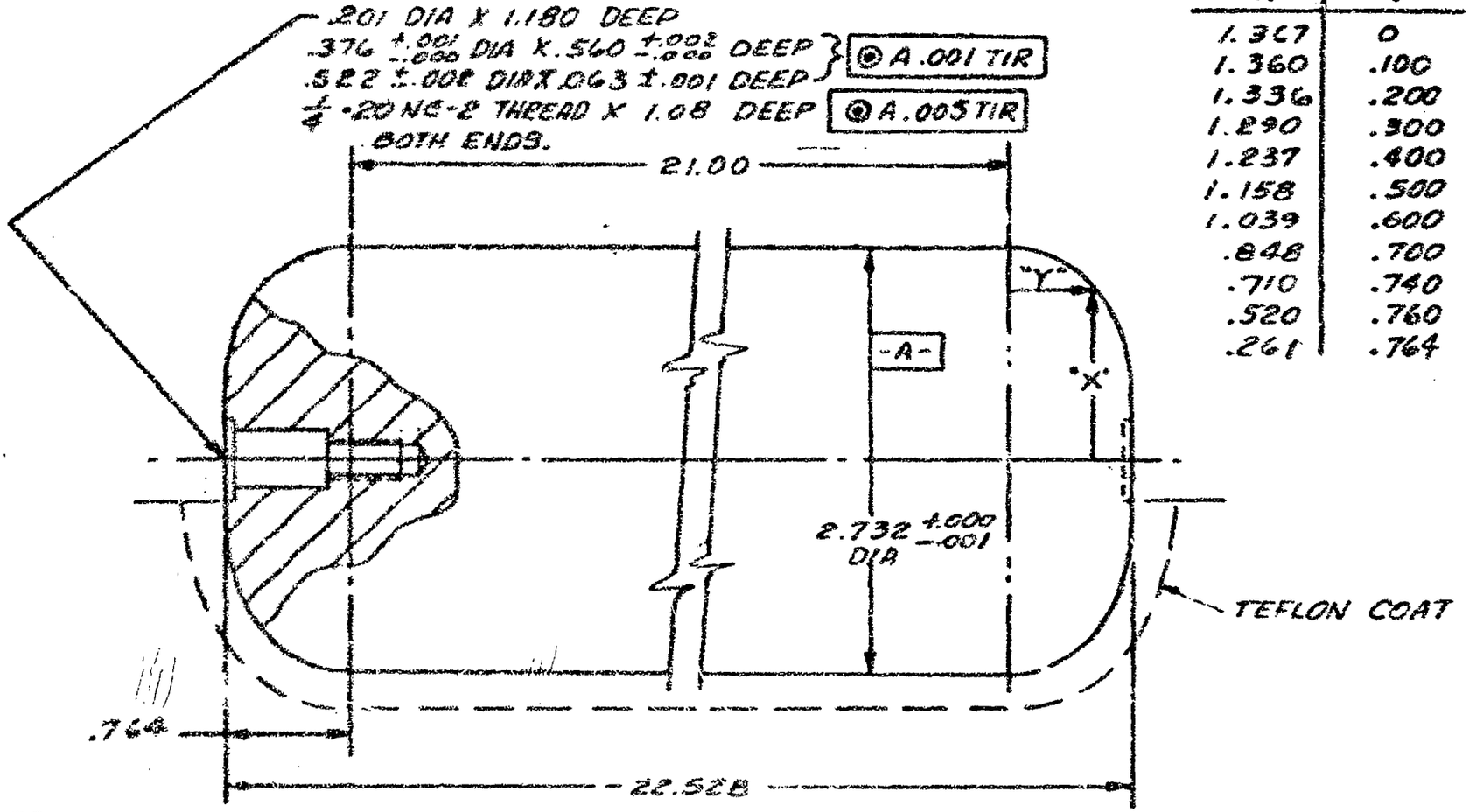
NOZZLE
1/1 SCALE

720608-2

APPENDIX B-3

ADVANCED MATERIAL DESIGN TOOLING SKETCHES *

* N.B. Portions of the nozzle tooling are compatible with the CIC design presented in Appendix A-3.



DOME COORDINATES.

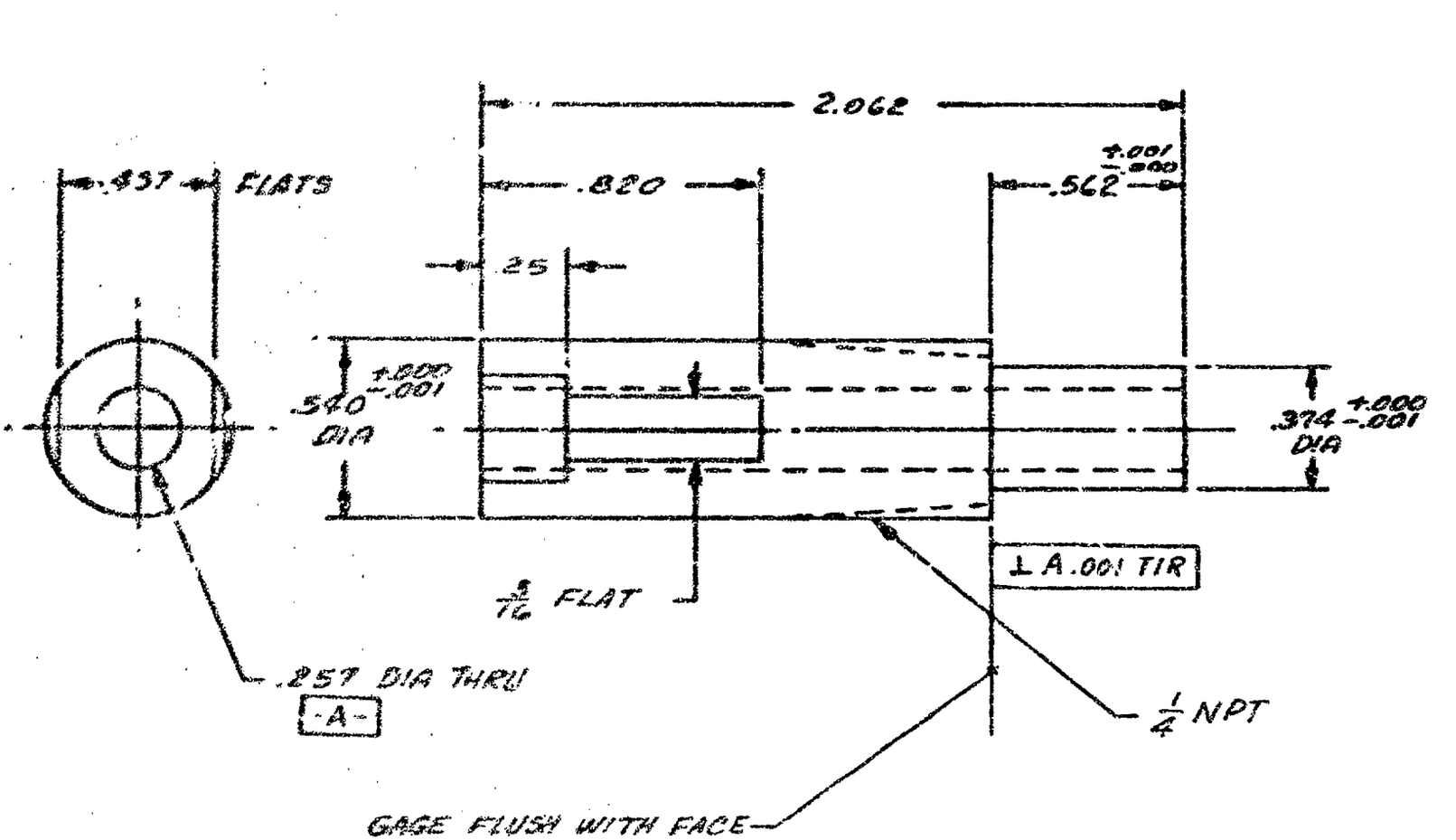
X	Y
1.367	0
1.360	.100
1.336	.200
1.290	.300
1.237	.400
1.158	.500
1.039	.600
.848	.700
.710	.740
.520	.760
.261	.764

NOTES :

1. MATERIAL : 2024 T 351 ALUMINUM OR EQUAL.
2. REMOVE ALL BURRS AND SHARP EDGES, .005 MAX R.
3. SURFACE FINISH $\sqrt{}$ ALL OVER.
4. DIMENSIONS TYPICAL FOR BOTH ENDS.
5. DIMENSIONS SHOWN ARE BEFORE TEFLON COATING.
6. GRIT BLAST AREA TO BE TEFLON COATED.
7. TEFLON COAT TO .001 MAX WHERE INDICATED.

PRO CASE MANDREL

SCALE 720619-1

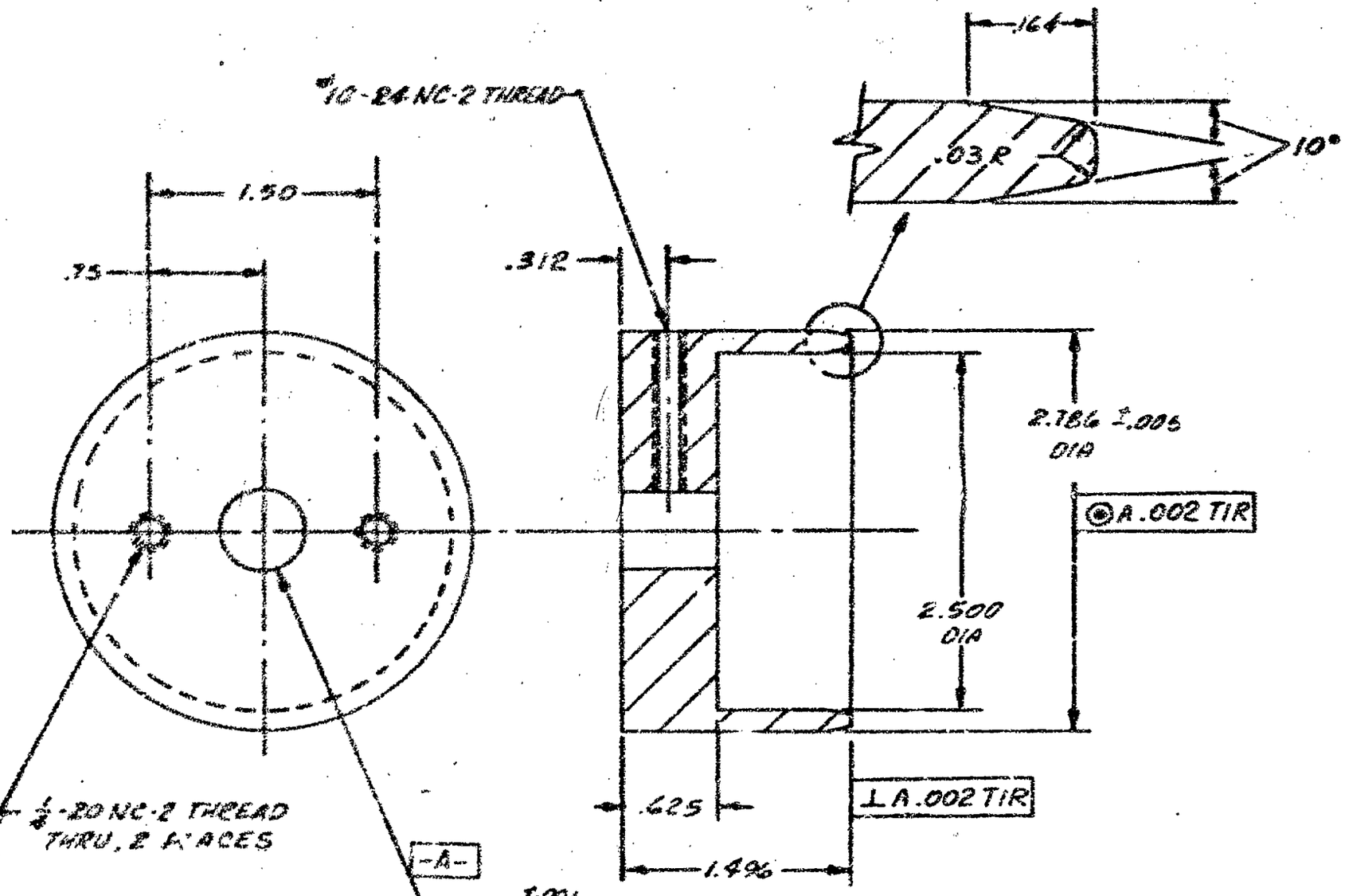


NOTES:

1. FINISH 63 √ ALL OVER.
2. MATERIAL: 305 STAINLESS STEEL, FREE MACHINING.
3. REMOVE ALL BURRS AND SHARP EDGES TO .005 R.
4. ALL DIAMETERS TO BE CONCENTRIC TO .257 DIA HOLE WITHIN .001 TIR. EACH END.

PRD MANDREL ADAPTER
2 REQUIRED

2/1 SCALE 720619

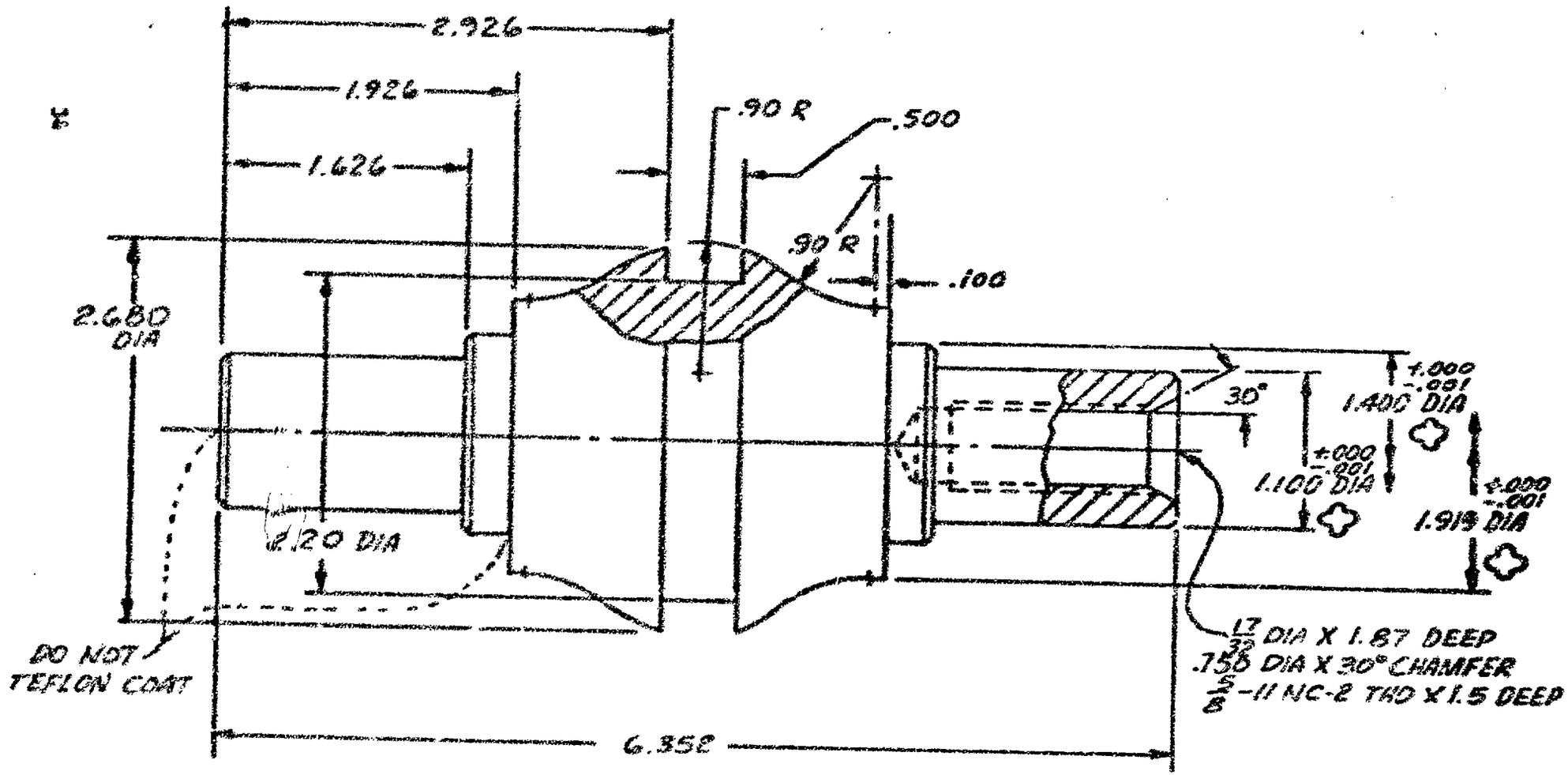


NOTES:

1. FINISH 63 √ ALL OVER
2. MATERIAL: 2024 T4 ALUM OR EQUAL.
3. REMOVE ALL BURRS AND SHARP EDEGES TO .010 R.

PRD SKIRT MANDREL
2-REQ'D

+ SCALE 720620-1



NOTES :

1. MATERIAL : 2024 T351 ALUMINUM OR EQUAL.
2. SURFACE FINISH ▽ ALL OVER.
3. REMOVE ALL BURRS AND SHARP EDGES, .005 MAX. R.
4. ALL DIMENSIONS TYPICAL FOR BOTH ENDS.
5. ALL DIAMETERS TO BE CONCENTRIC .001 TIR WITH CENTERS.
6. DIMENSIONS SHOWN ARE BEFORE TEFLON COATING.
7. GRIT BLAST AREA TO BE TEFLON COATED.
8. TEFLON COAT TO .001 MAX. AS SHOWN.
9. SYMBOL ⬡ INDICATES RESULTS TO BE REPORTED BY FABRICATOR.

MANDREL BODY, NOZZLE

SCALE 720707

APPENDIX B-4

ADVANCED MATERIAL DESIGN MANUFACTURING AND INSPECTION RECORDS

ROGER DALE

Manufacturing & Inspection Record

3.0 Dia. x 5.05 lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1

	Operator No.
1. Winding Preperation	
Machine set up installed. Level wind set to .312 lead.	149
Shaft extension T. I. R. .625.	832
O-rings, screws, adapters and holes waxed.	837
Mandrel cleaned properly	832
(2) O-rings assembled properly.	832
Roving (P.R.D., Type III, 12-end) installed. Lot No. _____.	
Roving tension: 1. 13 2. 7	832
2. Winding	
Resin mixed correctly:	832

	Ingredient	Weight, grs.	Lot No.	
Resin	2256	100	4842-17	
Catalyst	Tonox 60/40	29	A861-7	832

2. Winding (cont.)

Operator No.

Sequence check off:

X	0	X	C-1A	C-1A	0	X	0	0	X	C-1F	C-1F	R	R
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Level wind reset to 0.156

OF	OF	C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	OF	OF	C-5F	C-5F
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Level wind reset to 0.312

0	C-6F	C-6F	C-2A	C-2A	0	C-7F	C-7F	C-3A	C-3A	C	L	L	C	C-8F	DO	C-8F	DO	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

DO	C-4A	DO	C-9F	DO	C-9F	DO	C-5A	DO	C-5A	DO	C-10F	DO	C-10F	DO	C-6A	DO	C-6A	DO
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

DO	DO		
✓	✓		

NOTE:

X	designates	Helix	A	designates	Aft
0	"	Full 90°	R	"	O-Ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Fwd			

Doubler dia. measurements:

Unit serial No.	S/N 001	S/N 002
Outboard winding	3.170	3.181
Inboard winding	3.152	3.179
CENTER	3.172	

Excess resin removed without distorting winding

3. **B-Stage and Cure** — Operator No.

B-Stage: Time Started 2130 Time Completed 0045 — 4168

Date 8-2-72 — 4168

Cure: Time Started 0115 at 300 °F.

Time Completed 0415 at 300 °F.

Date 8-2-72 — 4168

4. **Machining and Stripping**

Parameter	Actuals			
Unit Identification	S/N 001		S/N 002	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 +.000 Fwd -.010 dia.	3.150	3.150	3.150	3.149
3.150 +.000 Aft -.010 dia.	3.150	3.150	3.150	3.149
2.734 +.004 -.000 dia.	2.735	2.735	2.735	2.735
.43 ± .030	.437	.436	.435	.437
8.05 ± .030	8.045	8.044	8.045	8.042
.060 ± .010	.060	.059	.065	.062

Operator No.

5. **Finishing**

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	Epon 9/6A	100	ADL-57	782
Catalyst	Epon 9/6B	15	ADL-57	782
Thinner	Acetone	50	ADL-69	782

Cure: Time Started 1315 at 72.5 °F.

Time Complete 2115 at 72.3 °F.

Date 5-7-72 1104

Clean up work performed satisfactorily. 1894

Final Wt.: S/N 001, S/N 002

Wt. 26 Grams, Wt. 264 Grams 399

Supervisor Review [signature] Date 5-10-72

Engineer Review _____ Date _____

C600.102

Manufacturing & Inspection Record

3.0 Dia. x 8.05 Lg. Motor Case

P.R.D. Shell Fabrication

S/N 003 Dwg. 720608-1 Rev. A
S/N 004 Dwg. 720608-1 Rev. B

	Operator No.
1. Winding Preparation	
Machine set up installed. Level wind set to .312 lead.	826
Shaft extension T. I. R. .030.	2125
O-rings, screws, adapters and holes waxed.	2125
Mandrel cleaned properly	2125
(2) O-rings assembled properly.	2125
Roving (P.R.D., Type III, 12-end) installed. Lot No. S7.	2125
Roving tension: 1. 2 lbs 2. 2 lbs	2125
2. Winding	
Resin mixed correctly:	2125

	Ingredient	Weight, gms.	Lot No.	
Resin	2254	500	10459	
Catalyst	Tonox	145	4017	2125

2. Winding (Con't)

Sequence check off for S/N 003 & 004

Operator No. 9125

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
X	X	X	X	X	X	X	X	X	✓	✓	X	X	X	X	X	X	X	X	X

Sequence continued S/N 004 Headstock

Operator No. 4-6

C-2F	C-3F	DO	C-4F	C-5F	C-4A	C-5A
X	X	X	✓	✓	✓	✓

Sequence continued S/N 003 Tailstock

Operator No. 7-6

C-2F	DO	C-3F	DO	C-4F	C-4A
X	X	X	X	✓	✓

Sequence continued S/N 004 Headstock

Operator No. 7-6

O	C-3F	C-7F	C-3A	C-7A	C-6F	C-4F	C-2A	C-6A	O	C-1CA	C-1A	DO	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	

Sequence continued S/N 003 Tailstock

Operator No. 7-6

O	C-3F	C-5A	O	C-6F	C-7A	O	C-7F	C-7A	DO	C-4A	DO	C-5A	DO	L
✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

NOTE:

X	Designates	Helix	A	Designate:	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Fwd			

Doubler diameter measurements:

Unit serial No.	S/N [illegible]	S/N [illegible]
Outboard winding	3.191	3.185
Inboard winding	3.191	3.196

Operator No. 7-6

Excess resin removed without distorting winding

Operator No. 7-6

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 0700 1/11/73 Time Completed 1100 hrs 1/11/73 3970

Date 1/14/73 3910

Cure: Time Started 1200 1/14/73 at 300 °F.

Time Completed 1600 at 305 °F.

Date 1/14/73 3970

4. Machining and Stripcoin:

Parameter	Actuals			
Unit Identification	S/N 003		S/N 004	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 Pad - .010 dia.	3.150	3.149	3.150	3.150
3.150 + .000 Air - .010 dia.	3.1485	3.148	3.148	3.147
2.734 + .004 - .000 dia.	2.736	2.736	2.735	2.735
.63 ± .030	.632		.627	
8.437 ± .030	8.437		8.437	
.060 ± .010	.060		.065	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	516-M	50	HBL55	185
Catalyst	516-B	9½	FBL55	185

Cure: Time Started 0200 at 140 °F.

Time Complete 1000 at 140 °F.

Date 1-9-73 2125

Clean up work performed satisfactorily. 2125

Final Wt.: S/N 003, S/N 004

Wt. 477 gms, Wt. 476 gms 2125

Supervisor Review [signature] Date 1-9-73

Engineer Review [signature] Date 1-9-73

Manufacturing & Inspection Record S/N's 005 & 006

3.0 Dia. x 8.05 In. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

Operator No.

1. Winding Preparation

Machine set up installed. Level wind set to .312 lead. ______

Shaft extension T. I. R. .015 . 1194

O-rings, screws, adapters and holes waxed. 1194

Mandrel cleaned properly 1194

(2) O-rings assembled properly. 1194

Roving (P.R.D., Type III, 12-end) installed. Lot No. [illegible] 1194

Roving tension: 1. 2 ½ 2. 3 [illegible]

2. Winding

Resin mixed correctly: [illegible]

	Ingredient	Weight, gms.	Lot No.	
Resin	[illegible]	[illegible]	[illegible]	
Catalyst	[illegible]	[illegible]	[illegible]	1194

2. Winding (Con't)

Sequence check off

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Operator No. 2125

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

4168

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

Sequence continued

DO	DO	DO	DO	C-8A	C-8A	DO	DO	C-9A	C-9A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

4168

NOTE:

X	Designates	Helix	A	Designates	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Fwd			

Doubler diameter measurements:

Unit serial No.	S/N 005	S/N 006
Outboard winding	3.197	3.197
Inboard winding	3.200	3.202

2125

Excess resin removed without distorting winding

2125

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 2130 Time Completed 2245 66E

Date 2-15-73 66E

Cure: Time Started 0515 at 300 °F.

Time Completed 0800 at 300 °F.

Date 2/16/73 3564

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 005		S/N 006	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 +.000 Rad -.010 dia.	3.145	3.144	3.1145	3.142
3.150 +.000 dia -.010 dia.	3.147	3.145	3.147	3.147
3.734 +.004 -.003 dia.	3.740	3.739	3.7405	3.740
.43 ± .030	.442		.431	
8.437 ± .030	8.442	8.441	8.443	8.442
.060 ± .010	.065		.060	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, ms.	Lot No.	
Adhesive	ERL 1256	100	ERL-95	829
Catalyst	Tri-X-Amine	37	ERL-X	829

Cure: Time Started 11:00 2-26-93 at 140 °F.

Time Complete 2:30 at 140 °F.

Date 2/11/93 667

Clean up work performed satisfactorily. _____

Final Wt.: S/N: 005, S/N: 006

Wt. 302, Wt. 304 _____

Supervisor Review _____ Date _____

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 007 & 008

3.0 Dia. x 2.05 lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

Operator No.

1. Winding Preparation

Machine set up installed. Level wind set to .312 lead. _____

Shaft extension T. I. R. .015. 716

O-rings, screws, [illegible] waxed. 716

Mandrel cleaned properly 716

(2) O-rings assembled properly. 716

Roving (P.R.D., Type III, 12-end) installed. Lot No. 291-A. 716

Roving tension: 1. 2½ 2. 2½ 716

2. Winding

Resin mixed correctly: 716

	Ingredient	Weight, grs.	Lot No.	
Resin	[illegible]	[illegible]	[illegible]	
Catalyst	[illegible]	[illegible]	[illegible]	[illegible]

Reproduced from best available copy.

2. Winding (Con't)

Sequence check off

Operator No.

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sequence continued

DO	DO	DO	DO	C-7A	C-6A	DO	DO	C-5A	C-5A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

NOTE:

X	Designates	Helix	A	Designates	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Pad			

Doubler diameter measurements:

Unit serial No.	S/N 007	S/N 008
Outboard winding	7.252	7.261
Inboard winding	7.232	7.221

Excess resin removed without distorting winding

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 0330 Time Completed 1330 832

Date 2-20-73 832

Cure: Time Started 1415 at 285 °F.

Time Completed 1715 at 360 °F.

Date 2-20-73 293

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 007		S/N 008	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia. Fwd	3.148	3.1475	3.149	3.147
3.150 + .000 - .010 dia. Aft	3.147	3.146	3.148	3.147
2.734 + .004 - .000 dia.	2.7345	2.733	2.7340	2.7335
.43 ± .030	.429		.433	
8.437 ± .030	8.444	8.443	8.1142	8.440
.060 ± .010	.060		.063	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	ERL-2256	100	A8L-35	829
Catalyst	TENAX 6040	27	A3L-8	507

Cure: Time Started 1500 2-28-73 at 140 °F.

Time Complete 2300 at 140 °F.

Date 2/28/73 669

Clean up work performed satisfactorily. _____

Final Wt.: S/N 007, S/N 008

Wt. 299, Wt. 301 _____

Supervisor Review _____ Date _____

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 009 & 010

3.0 Dia. x 8.05 Lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

	Operator No.
1. Winding Preparation	
Machine set up installed. Level wind set to .312 lead.	
Shaft extension T. I. R. .015.	1691
O-rings, screws, adapters and holes waxed.	1054
Mandrel cleaned properly	1077
(2) O-rings assembled properly.	1194
Roving (P.R.D., Type III, 12-end) installed. Lot No. [illegible]	1824
Roving tension: 1. 2 2. 2	[illegible]
2. Winding	
Resin mixed correctly:	2105

	Ingredient	Weight, gms.	Lot No.	
Resin	ERL 2256	100	ASL 27	
Catalyst	Tonox	29	ASL 5	2135

2. Winding (Con't)

Sequence check off

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

Operator No 2125

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

2125

Sequence continued

DO	DO	DO	DO	C-8A	C-8A	DO	DO	C-9A	C-9A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

NOTE:

X	Designates Helix	A	Designates Aft
O	" Full 90°	R	" O-ring
L	" Label	OF	" 90° Fill
C	" Cloth	DO	" Doubler 90°
F	" Rad		

Doubler diameter measurements:

Unit serial No.	S/N 009	S/N 010
Outboard winding	3.122	3.123
Inboard winding	3.225	3.220

3.225

Excess resin removed without distorting winding

3.125

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 1515 Time Completed 2115 — 669

Date 2-22-73 — 669

Cure: Time Started 2130 at 300 °F.

Time Completed 0030 at 300 °F.

Date 2-23-73 — 782

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 009		S/N 010	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 +.000 Fwd -.010 dia.	3.147	3.147	3.145	3.147
3.150 +.000 Aft -.010 dia.	3.147	3.146	3.149	3.148
2.734 +.004 -.000 dia.	2.741	2.740	2.741	2.740
.43 ± .030	.432		.429	
8.437 ± .030	8.442	8.441	8.444	8.443
.060 ± .310	.060		.060	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	ERL-1926	100	ARL-26	827
Catalyst	TONOX 6140	29	ARL-8	827

Cure: Time Started 1400-2-25-73 at 140 °F.

Time Complete 2300 at 140 °F.

Date 2/28/73 669

Clean up work performed satisfactorily.

Final Wt.: S/N 009, S/N 010

Wt. 307, Wt. 301

Supervisor Review _____ Date _____

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 011 & 012

3.0 Dia. x 8.05 l., Motor Case

P.R.D. Shell Fabrication

Dwg. 720603-1 Rev. A

	Operator No.
1. Winding Preparation	
Machine set up installed. Level wind set to .312 lead.	426
Shaft extension T. I. R. .012.	1857
O-rings, screws, adapters and holes waxed.	1857
Mandrel cleaned properly	1857
(2) O-rings assembled properly.	1857
Roving (P.R.D., Type III, 12-end) installed. Lot No. 2-CB 322.	1857
Roving tension: 1. 1 2. 1½	1857
2. Winding	
Resin mixed correctly:	1857

	Ingredient	Weight, gms.	Lot No.	
Resin	[illegible]	[illegible]	[illegible]	
Catalyst	[illegible]	[illegible]	[illegible]	1857

2. Winding (Con't)

Sequence check off

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Operator No. 2125

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

Sequence continued

DO	DO	DO	DO	C-8A	C-8A	DO	DO	C-9A	C-9A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

NOTE:

X	Designates	Helix	A	Designates	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
P	"	Pad			

Doubler diameter measurements:

	S/N 011	S/N 012	
Unit serial No.			
Outboard winding	3.184	3.189	
Inboard winding	3.244	3.234	2125
Excess resin removed without distorting winding			2125

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 1300 Time Completed 1800 — 78

Date 2-27-73 — 78

Cure: Time Started 1900 at 300 °F.

Time Completed 2200 at 300 °F.

Date 2-27-73 — 393

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 011		S/N 012	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 Fwd - .010 dia.	3.148	3.1475	3.147	3.146
3.150 + .000 Aft - .010 dia.	3.146	3.145	3.146	3.145 ~~3.143~~
2.734 + .004 - .000 dia.	2.7405	2.740	2.741	2.7405
.43 ± .030	.427		.427	
8.437 ± .030	8.441		8.440	
.060 ± .010	.065		.065	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	ERL-2256	100	ABL-27	4168 X27
Catalyst	TONOX 6040	29	ABL-8	4168 827

Cure: Time Started 1130 - 3-1-63 at 140 °F.

Time Complete 1430 at 140 °F.

Date 3/1/63 4210

Clean up work performed satisfactorily. 3924

Final Wt.: S/N 011, S/N 012

Wt. 303 GRAMS, Wt. 302 GRAMS 880 - 0811

Supervisor Review Q. A Barrett Date 3/1/63

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 013 & 014

3.0 Dia. x 8.05 lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

Operator No.

1. Winding Preparation

Machine set up installed. Level wind set to .312 lead. 820

Shaft extension T. I. R. .022 832

O-rings, screws, adapters and holes waxed. 832

Mandrel cleaned properly 832

(2) O-rings assembled properly. 832

Roving (P.R.D., Type III, 13-end) installed. Lot No. _____ _____

Roving tension: 1. 2# 2. 2# 832

2. Winding

Resin mixed correctly: 832

	Ingredient	Weight, grs.	Lot No.	
Resin	22.5%	500	ABL-27	
Catalyst	Tonox 6-40	145	ABL-P	832

60

2. Winding (Con't)

Sequence check off

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
X	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Operator No 786

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

Sequence continued

DO	DO	DO	DO	C-1A	C-1A	DO	DO	C-2A	C-2A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

NOTE:

X	Designates Helix		A	Designates Aft	
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Pad			

Doubler diameter measurements:

Unit serial No.	S/N 013	S/N 014
Outboard winding	3.194	3.200
Inboard winding	3.253	3.261

786

Excess resin removed without distorting winding

786

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 2215 Time Completed 0130 880

Date 3-1-73 880

Cure: Time Started 0200 at 285 °F.

Time Completed 0500 at 300 °F.

Date 3-1-73 880

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 013		S/N 014	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 Fwd, - .010 dia.	3.150		3.149	
3.150 + .000 Aft, - .010 dia.	3.147		3.145	
2.734 + .004, - .000 dia.	2.741	2.740	2.740	2.740
.43 ± .030	.437		.443	
8.437 ± .030	8.437		8.446	
.060 ± .010	.065		.065	

1147

Operator No.

5. **Finishing**

Coating mixed correctly:

	Ingredient	Weight, grs.	Lot No.	
Adhesive	2256	100	AB627	669
Catalyst	Tonox 60	29	AGL8	669

Cure: Time Started 1615 at 14 °F.

Time Complete 0015 at 14 °F.

Date 5/1/23 4210

Clean up work performed satisfactorily. 3924

Final Wt.: S/N 013, S/N 014

Wt. _____, Wt. 311 gm 3924

The last was used for bonding

Supervisor Review C Smith Date 5/1/23

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 015 & 016

3.0 Dia. x 8.05 Lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

	Operator No.
1. Winding Preparation	
Machine set up installed. Level wind set to .312 lead.	149
Shaft extension T. I. R. .025.	2125
O-rings, screws, adapters and holes waxed.	2125
Mandrel cleaned properly	2125
(2) O-rings assembled properly.	2125
Roving (P.R.D., Type III, 12-end) installed. Lot No. 2022-3-1.	2125
Roving tension: 1. 2 2. 2	2125
2. Winding	
Resin mixed correctly:	2125

	Ingredient	Weight, gms.	Lot No.	
Resin	2255	100	4R-37	
Catalyst	Tonox	29	4B-4	2125

2. Winding (Con't)

Sequence check off

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Operator No. 786

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

Sequence continued

DO	DO	DO	DO	C-8A	C-8A	DO	DO	C-9A	C-9A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

786

NOTE:

X	Designates	Helix	A	Designates	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Fwd			

Doubler diameter measurements:

Unit serial No.	S/N 015	S/N 016
Outboard winding	3.211	3.190
Inboard winding	3.236	3.250

786

Excess resin removed without distorting winding

786

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 2045 Time Completed 2400 — 880

Date 3-1-73 — 880

Cure: Time Started 0030 at 300 °F.

Time Completed 0315 at 300 °F.

Date 3-2-73 — 880

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 015		S/N 016	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 Fwd - .010 dia.	3.145	3.144	3.149	3.147
3.150 + .000 Aft - .010 dia.	3.147	3.146	3.146	3.145
2.734 + .004 - .000 dia.	2.7345	2.740	2.741	2.7345
.43 ± .030	.429		.430	
8.437 ± .030	8.454	8.453	8.450	8.445
.060 ± .010	.060		.062	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	Epon 9614	50.0	ABL-60	782
Catalyst	Epon 9613	7.5	ABL-60	782
Acetone	_____	40.0	ABL-78	782

Cure: Time Started 1630 at 130 °F.

Time Complete 0030 at 130 °F.

Date 3-6-73 776

Clean up work performed satisfactorily. 3924

Final Wt.: S/N 015, S/N 016

Wt. 301 GRAMS, Wt. ~~302~~ 297 GRAMS 3-14-73 23 8880-4241

Supervisor Review A.O. Sowell Date 3/14/73

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 017 & 018

3.0 Dia. x 8.05 lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

	Operator No.
1. Winding Preparation	
Machine set up installed. Level wind set to .312 lead.	832
Shaft extension T. I. R. .017.	832
O-rings, screws, adapters and holes waxed.	832
Mandrel cleaned properly	832
(2) O-rings assembled properly.	832
Roving (P.R.D., Type III, 12-end) installed. Lot No. 66C10.	832
Roving tension: 1. 2¼ 2. 2¼	832
2. Winding	
Resin mixed correctly:	832

	Ingredient	Weight, gms.	Lot No.	
Resin	22.5%	570	ABC-27	
Catalyst	tonox 40	145	ABC-9	832

2. Winding (Con't)

Sequence check off

Operator

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

Sequence continued

DO	DO	DO	DO	C-8A	C-8A	DO	DO	C-9A	C-9A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

NOTE:

X	Designates	Helix	A	Designates	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Fwd			

Doubler diameter measurements:

Unit serial No.	S/N 017	S/N 018
Outboard winding	3.194	3.195
Inboard winding	3.225	3.226

786

Excess resin removed without distorting winding

786

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 1145 Time Completed 1745 880

Date 3-16-73 880

Cure: Time Started 1800 at 290 °F.

Time Completed 2100 at 300 °F.

Date 3-16-73 880

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 017		S/N 018	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 Fwd - .010 dia.	3.148		3.148	
3.150 + .000 Aft - .010 dia.	3.147		3.149	
2.734 + .004 - .000 dia.	2.7405	2.746	2.7395	2.739
.43 ± .030	.433		.440	
8.437 ± .030	8.449	8.448	8.460	8.459
.060 ± .010	.065		.061	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	946 A	50	ABL-60	880
Catalyst	946 B	7½	ABL-60	880
Acetone	ACETONE	40	ABL-78	880

Cure: Time Started 4-18-73 1945 at 75 °F.

Time Complete 1945 at 75 °F.

Date 4-19-73 #210

Clean up work performed satisfactorily. #210

Final Wt.: S/N 017, S/N 018

Wt. 298, Wt. 300 #210

Supervisor Review A.J. Bacelli Date 4/4/73

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 019 & 020

2.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	226
Shaft extension T. I. R. .025.	2125
O-rings waxed only.	2125
Mandrel cleaned properly	2125
(4) O-rings and mandrel assembled properly.	2125
Roving (S904, 12-end) installed. Lot No. ABL5.	2125
Roving tension: 1. 7 2. 14 3. 8	2125
2. Winding	
Resin mixed correctly:	2125

	Ingredient	Weight, gms.	Lot No.	
Resin	2256	100	ABL27	
Catalyst	Tonox	29	A13L8	2125

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

Throat dia. measurements:

Unit Serial No.	S/N 019	S/N 020
After (6) 90° Winding:	2.275	2.277
After cloth/90° Buildup:	2.750	2.750

2125

Excess resin removed without distorting winding 2125

Doublers wound correctly at each end 2125

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 1500 Time Completed 1530 — 745

Date 3-2-73 — 786

Cure: Time Started 1900 at 295 °F.

Time Completed 2200 at 300 °F.

Date 3-2-73 — 786

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 019		S/N 020	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.145		3.149	
2.491 + .000 - .002 dia.	2.490		2.490	
Throat Dia.-Record 1.922 + .000 - .003 dia.	1.922	1.9215	1.9225	1.922
2.731 + .000 - .004 dia.	2.729	2.728	2.729	2.7285
2.946 I.D. Exit Plane-Record	2.958	2.955	2.961	2.955
.210 ± .005	.212		.211	

1147

Operator No.

5. **Finishing**

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	Epon [illegible]	50.0	881-60	772
Catalyst	Epon [illegible]	7.5	881-60	772
Thinner	Acetone	10.0	881-78	772

Cure: Time Started 1630 at 130 °F.

Time Complete 0030 at 130 °F.

Date 3/6/73 776

Clean up work performed satisfactorily. 3921

Final Wt.: S/N 019, S/N 020

Wt. 136 GRAMS, Wt. 135 GRAMS 880 - 9211

Supervisor Review [signature] Date 3/[illegible]/[illegible]

Engineer Review __________ Date ______

Manufacturing & Inspection Record   S/N's 019 & 020

3.0 Dia. x 8.05 Lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

	Operator No.
1. Winding Preparation	
Machine set up installed. Level wind set to .312 lead.	119
Shaft extension T. I. R. .004	716
O-rings, screws, adapters and holes waxed.	716
Mandrel cleaned properly	716
(2) O-rings assembled properly.	716
Roving (P.R.D., Type III, 12-end) installed. Lot No. [illegible]	716
Roving tension: 1. [illegible] 2. [illegible]	716
2. Winding	
Resin mixed correctly:	716

	Ingredient	Weight, gms.	Lot No.	
Resin	[illegible]	[illegible]	ARL 27	
Catalyst	[illegible]	145	ARL 4	716

2. Winding (Con't)

Sequence check off

Operator No

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

189

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

189

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

189

Sequence continued

DO	DO	DO	DO	C-8A	C-8A	DO	DO	C-9A	C-9A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

189

NOTE:

X	Designates	Helix	A	Designates	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Fwd			

Doubler diameter measurements:

Unit serial No.	S/N 019	S/N 020
Outboard winding	3.206	3.192
Inboard winding	3.277	3.282

189

Excess resin removed without distorting winding

189

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 1045 Time Completed 1645 776

Date 3/20/73 776

Cure: Time Started 1700 at 300 °F.

Time Completed 2000 at 300 °F.

Date 3/20/73 827

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 019		S/N 020	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 Fwd dia.	3.145		3.149	
3.150 + .000 - .010 Aft dia.	3.147		3.146	
2.734 + .004 - .000 dia.	2.7415	2.741	2.741	2.7405
.43 ± .030	.445		.432	
8.437 ± .030	8.447	8.446	8.452	8.451
.060 ± .010	.062		.060	

1147

Operator No.

5. **Finishing**

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	946 A	50	ABL-60	850
Catalyst	946 B	7½	ABL-60	880
Acetone	ACETONE	40	ABL-78	880

Cure: Time Started 4-18-73 1945 at 75 °F.

Time Complete 1945 at 75 °F.

Date 4-19-73 4210

Clean up work performed satisfactorily. 4210

Final Wt.: S/N 019, S/N 020

Wt. 306, Wt. 303 4210

Supervisor Review A A Brandt Date 4/19/73

Engineer Review _____ Date _____

Manufacturing & Inspection Record

S/N's 021 & 022

3.0 Dia. x 8.05 Lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

	Operator No.
1. Winding Preparation	
Machine set up installed. Level wind set to .312 lead.	2125
Shaft extension T. I. R. .021.	2125
O-rings, screws, adapters and holes waxed.	2125
Mandrel cleaned properly	2125
(2) O-rings assembled properly.	2125
Roving (P.R.D., Type III, 12-end) installed. Lot No. 8-2.	2125
Roving tension: 1. 2 2. 2 1/2	2125
2. Winding	
Resin mixed correctly:	2125

Ingredient	Weight, gms.	Lot No.	
Resin 2256	100	43427	
Catalyst TONOX	29	A3429	2125

2. Winding (Con't)

Sequence check off

X	O	C-1A	C-1A	X	O	C-2F	C-2F	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Operator No. 2125

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

Sequence continued

DO	DO	DO	DO	C-5A	C-5A	DO	DO	C-6A	C-6A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

NOTE:

X	Designates	Helix	A	Designates	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Fwd			

Doubler diameter measurements:

Unit serial No.	S/N 021	S/N 022
Outboard winding	3.190	3.193
Inboard winding	3.243	3.253

2125

Excess resin removed without distorting winding

2125

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 2315 Time Completed 0430 786

Date 3-28-73 786

Cure: Time Started 0500 at 255 °F.

Time Completed 0800 at 300 °F.

Date 3-29-73 782

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 021		S/N 022	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 Fwd - .010 dia.	3.148		3.149	
3.150 + .000 Aft - .010 dia.	3.145		3.146	
2.734 + .004 - .000 dia.	2.740	2.739	2.741	2.740
.43 ± ..030	.440		.437	
8.437 ± ..030	8.451	8.450	8.451	8.450
.060 ± .010	.061		.055	

1147

Operator No.

5. **Finishing**

Coating mixed correctly:

	Ingredient	Weight, ms.	Lot No.	
Adhesive	946 A	50	ABL-60	830
Catalyst	946 B	7 1/2	ABL-60	880
Acetone	ACETONE	40	ABL-76	880

Cure: Time Started 4-18-73 1945 at 75 °F.

Time Complete 1945 at 75 °F.

Date 4-19-73 4210

Clean up work performed satisfactorily. 4210

Final Wt.: S/N 021, S/N 022

Wt. 302, Wt. 301 4210

Supervisor Review A.C. Barrett Date 4/19/73

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 023 & 024

3.0 Dia. x 8.05 lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

Operator No.

1. Winding Preparation

Machine set up installed. Level wind set to .312 lead. [illegible]

Shaft extension T. I. R. .011. [illegible]

O-rings, screws, adapters and holes waxed. [illegible]

Mandrel cleaned properly [illegible]

(2) O-rings assembled properly. [illegible]

Roving (P.R.D., Type III, 12-end) installed. Lot No. [illegible]. [illegible]

Roving tension: 1. [illegible] 2. [illegible] [illegible]

2. Winding

Resin mixed correctly: [illegible]

	Ingredient	Weight, gms.	Lot No.	
Resin	[illegible]	[illegible]	[illegible]	
Catalyst	[illegible]	[illegible]	[illegible]	[illegible]

2. Winding (Con't)

Sequence check off

Operator No.

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

4165

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

4168

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

785

Sequence continued

DO	DO	DO	DO	C-8A	C-8A	DO	DO	C-9A	C-9A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

785

NOTE:

X	Designates	Helix	A	Designates	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Fwd			

Doubler diameter measurements:

Unit serial No.	S/N 023	S/N 024
Outboard winding	3.190	3.195
Inboard winding	3.250	3.258

756

Excess resin removed without distorting winding

756

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 0130 Time Completed 0530 669

Date 3-29-73 669

Cure: Time Started 0545 at 300 °F.

Time Completed 0845 at 300 °F.

Date 3-29-73 782

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 023		S/N 024	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 Fwd - .010 dia.	3.1485		3.149	
3.150 + .000 Aft - .010 dia.	3.146		3.147	
2.734 + .004 - .000 dia.	2.7411	2.7405	2.7411	2.7405
.43 ± .030	.435		.440	
8.437 ± .030	8.447	8.448	8.452	8.451
.060 ± .010	.064		.064	

1117

Operator No.

5. **Finishing**

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	946A	50	ABL-60	880
Catalyst	946 B	7½	ABL-60	880
Acetone	ACETONE	40	ABL-78	880

Cure: Time Started 4-18-73 1945 at 75 °F.

Time Complete 1945 at 75 °F.

Date 4-19-73 4210

Clean up work performed satisfactorily. 4210

Final Wt.: S/N 023, S/N 024

Wt. 297, Wt. 297 4210

Supervisor Review A.N. Barnes Date 4/19/73

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 025 & 026

3.0 Dia. x 8.05 Lg. Motor Case

P.R.D. Shell Fabrication

Dwg. 720608-1 Rev. A

	Operator No.
1. Winding Preperation	
Machine set up installed. Level wind set to .312 lead.	716
Shaft extension T. I. R. .023.	716
O-rings, screws, adapters and holes waxed.	716
Mandrel cleaned properly	716
(2) O-rings assembled properly.	716
Roving (P.R.D., Type III, 12-end) installed. Lot No. 0935-7 0945-15	716
Roving tension: 1. 1 3/4 2. 2	716
2. Winding	
Resin mixed correctly:	716

	Ingredient	Weight, grs.	Lot No.	
Resin	2256	100	AHL 27	
Catalyst	TONOX 60/40	24	AKL 9	716

2. Winding (Con't)

Sequence check off

Operator No.

X	O	C-1A	C-1A	X	O	C-2A	C-2A	X	O	C-3A	C-3A	X	O	C-1F	C-1F	R	R	OF	OF
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1951

Sequence continued

C-2F	C-2F	OF	OF	C-3F	C-3F	OF	OF	C-4F	C-4F	C-4A	C-4A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1951

Sequence continued

O	C-5F	C-5F	C-5A	C-5A	O	C-6F	C-6F	C-6A	C-6A	O	C-7F	C-7F	C-7A	C-7A
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1951

Sequence continued

DO	DO	DO	DO	C-8A	C-8A	DO	DO	C-9A	C-9A	DO	DO	L	L
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1951

NOTE:

X	Designates	Helix	A	Designates	Aft
O	"	Full 90°	R	"	O-ring
L	"	Label	OF	"	90° Fill
C	"	Cloth	DO	"	Doubler 90°
F	"	Fwd			

Doubler diameter measurements

Unit serial No.	S/N 025	S/N 026
Outboard winding	3.193	3.182
Inboard winding	3.265	3.269

1951

Excess resin removed without distorting winding

1951

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 1130 Time Completed 1450 782

Date 3-30-73 782

Cure: Time Started 1500 at 300 °F.

Time Completed 1900 at 300 °F.

Date 3/30/73 776

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 025		S/N 026	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 Pad - .010 dia.	3.148		3.148	
3.150 + .000 Aft - .010 dia.	3.147		3.148	
2.734 + .004 - .000 dia.	2.741	2.7405	2.7415	2.741
.43 ± .030	.441		.434	
8.437 ± .030	8.449	8.445	8.445	8.447
.060 ± .010	.060		.061	

1147

Operator No.

5. Finishing

Casting mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	946 A	50	ABL-60	890
Catalyst	946 B	7 ±	ABL-60	880
Acetone	ACETONE	40	ABL-78	890

Cure: Time Started 4-18-73 1945 at 75 °F.

Time Complete 4-19-73 1945 at 75° °F.

Date 4-19-73 4210

Clean up work performed satisfactorily. 4210

Final Wt.: S/N 025, S/N 026

Wt. 302, Wt. 300 gms. 4210

Supervisor Review D.O. Smith Date 7/6/73

Engineer Review _____ Date _____

R. J. DALE W/O C402.041

Manufacturing & Inspection Record

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed. Level wind set to _____	_____
Shaft extension T. I. R. .01	786
O-rings waxed only.	786
Mandrel cleaned properly	786
(4) O-rings and mandrel assembled properly.	786
Roving (S904, 12-end) installed. Lot No. 2053	786
Roving tension: 1. R. O 2. 1 3/4 3. 1 1/2	786
2. Winding	
Resin mixed correctly:	786

	Ingredient	Weight, gms.	Lot No.	
Resin	2256	100	ABL 17	
Catalyst	TONOX 60/40	29	ABL 7	786

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

→86

Throat dia. measurements:

Unit Serial No.	S/N 001	S/N 002
After (6) 90° Winding:	2.283	2.282
After cloth/90° Buildup:	2.770	2.774

788

Excess resin removed without distorting winding

786

Doublers wound correctly at each end

1894

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 1000 Time Completed 1415 — 1894

Date 7-21-72 — 1894

Cure: Time Started 1445 at 285 °F.

Time Completed 1745 at 300 °F.

Date 7/21/72 — 776

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N .001		S/N 002	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.148	3.147	3.150	3.149
2.491 + .000 - .002 dia.	2.491	2.490	2.491	2.490
1.922 + .000 - .003 dia.	1.920 2.920 DN	1.920 2.920 DN.	1.922 2.922 DN	1.922 2.922 DN.
2.731 + .000 - .004 dia.	2.730	2.729	2.729	2.728
2.946 ± .010 dia.	2.945	2.944	2.945	2.944
.210 ± .005	.210	.210	.210	.210

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	Operator No.
Adhesive	946 A	50	ABL 55	786
Catalyst	946 B	7½	ABL 55	786
Thinner	Acetone	40	ABL 69	786

Cure: Time Started 1830 at 136 °F.

Time Complete 0230 at 130 °F.

Date 7/25/72 3924

Clean up work performed satisfactorily. 3924

Final Wt.: S/N 001, S/N 002

Wt. 137 GRMS. 302 lb, Wt. 134 GR. .295 3924

Supervisor Review A.A. Bonelli Date 7/25/72

Engineer Review T.A. Kivens Date 7/26/72

Manufacturing & Inspection Record

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

Operator No.

1. Winding Preperation

Machine set up installed. Level wind set to _____ _____

Shaft extension T. I. R. .015. 786

O-rings waxed only. 786

Mandrel cleaned properly 786

(4) O-rings and mandrel assembled properly. 786

Roving (S904, 12-end) installed. Lot No. 2053 786

Roving tension: 1. 2 1/4 2. 1 1/4 3. 1 1/4 786

2. Winding

Resin mixed correctly: _____

	Ingredient	Weight, gms.	Lot No.	
Resin	[illegible]	[illegible]	[illegible]	
Catalyst	[illegible]	[illegible]	[illegible]	

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Throat dia. measurements:

Unit Serial No.	S/N 003	S/N [illegible]	
After (6) 90° Winding:	2.273	2.261	
After cloth/90° Buildup:	2.318	2.270	✓
Excess resin removed without distorting winding			✓
Doublers wound correctly at each end			✓

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 0930 Time Completed 1015 2125

Date 7/31/72 2125

Cure: Time Started 1100 at 500 °F.

Time Completed 1400 at 500 °F.

Date 7/31/72 2125

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 003		S/N 004	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.146	3.140	3.147	3.1475
2.491 + .000 - .002 dia.	2.490	2.4895	2.490	2.4895
1.922 + .000 - .003 dia.	1.920	1.920	1.9225	1.9224
2.731 + .000. - .004 dia.	2.731	2.731	2.731	2.731
2.946 ± .010 dia.	2.948	2.938	2.947	2.940
.210 ± .005	.210	.210	.210	.210

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	Epon 946 A Adv.	50.0	ABL-58	782
Catalyst	Epon 946 B	7.5	ABL-58	782
Thinner	Ethanol	40.0	ABL-69	782

Cure: Time Started 1400 at 120 °F.

Time Complete 2200 at 120 °F.

Date 8/10/12 3524

Clean up work performed satisfactorily. 3924

Final Wt.: S/N [illegible], S/N [illegible]

Wt. [illegible], Wt. [illegible] 126

Supervisor Revie- A J Bonelli Date 8/10/12

Engineer Review [illegible] Date [illegible]

C402.323

Manufacturing & Inspection Record

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

Operator No.

1. Winding Preperation

Machine set up installed. Level wind set to _____ 826

Shaft extension T. I. R. 25 . 4125

O-rings waxed only. 4211

Mandrel cleaned properly 4128

(4) O-rings and mandrel assembled properly. 4211

Roving (S904, 12-end) installed. Lot No. ABL-4 . 4128

Roving tension: 1. 2 lbs 2. 2½ lbs 3. 2 lbs 689

2. Winding

Resin mixed correctly: 665

	Ingredient	Weight, gms.	Lot No.	
Resin	3256	100	ABL-24	
Catalyst	TONOX 50/40	39	ABL-7	666

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2 RS/

Throat dia. measurements:

Unit Serial No.	S/N 005	S/N 006
After (6) 90° Winding:	2.277	2.281
After cloth/90° Buildup:	2.291	2.292

2 RS/

Excess resin removed without distorting winding 2 RS/

Doublers wound correctly at each end 2 RS/

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 2130 Time Completed 2030 — 3924

Date 12-16-72 — 3924

Cure: Time Started 0015 12-18-72 at 300 °F.

Time Completed 0330 12-18-72 at 310 °F.

Date 12-18-72 — 776

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 005		S/N 006	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.147		3.148	
2.491 + .000 - .002 dia.	2.4913	2.490	2.490	2.4895
1.922 + .000 - .003 dia.	1.9225	1.922	1.923	1.921
2.731 + .000 - .004 dia.	2.735		2.730	
2.946 ± .010 dia.	2.946	2.938	2.942	2.938
.210 ± .005	.205		.210	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, ms.	Lot No.	
Adhesive	3M EC1610	50	DA-10	4127
Catalyst	3M EC1610	7lb	DA-3	4127
Thinner	ACETONE	40	A-25	4125

Cure: Time Started 1600 at 140 °F.

Time Complete 1800 at 140 °F.

Date 12-20-72 299

Clean up work performed satisfactorily. 302

Final Wt.: S/N 005, S/N 006

Wt. 1465 gm, Wt. 1190 gm 304

Supervisor Review C.O. Brandt Date 12-20-72

Engineer Review F.K. Rivers Date 12/20/72

Manufacturing & Inspection Record

S/N's 007 & ~~008~~

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	-
Shaft extension T. I. R. .025.	2125
O-rings waxed only.	2125
Mandrel cleaned properly	2125
(4) O-rings and mandrel assembled properly.	2125
Roving (S904, 12-end) installed. Lot No. [illegible].	2125
Roving tension: 1. 2 2. 2.5 3. 2	2125
2. Winding	
Resin mixed correctly:	2125

	Ingredient	Weight, gms.	Lot No.	
Resin	2256	500	AR127	
Catalyst	TONOX	145	ABL2	2125

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0 · 0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

Throat dia. measurements:

Unit Serial No.	S/N 007	S/N 008	
After (6) 90° Winding:	2.272	2.276	
After cloth/90° Buildup:	~~2.276~~ 2.747 (RP 2/15/73)	2.746	786
Excess resin removed without distorting winding			786
Doublers wound correctly at each end			786

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 0600 Time Completed 1000 880

Date 2-15-73 880

Cure: Time Started 1000 at 300 °F.

Time Completed 1300 at 300 °F.

Date 2-15-73 885

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 007		S/N 008	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.148		3.146	
2.491 + .000 - .002 dia.	2.490		2.489	
1.922 + .000 - .003 dia.	1.9215	1.921	1.924	1.921
2.731 + .000 - .004 dia.	2.728		2.7275	
2.946 ± .010 dia.	2.952	2.942	2.956	2.947
.210 ± .005	.209		.208	

1147

Operator No.

J. Finishing

Coating mixed correctly: S/N 007

	Ingredient	Weight, gms.	Lot No.	
Adhesive	946A	50	ABL64	4145
Catalyst	946B	7½	ABL64	4145
Thinner	ACETONE	~~40~~ 40	ABL78	4145

Cure: Time Started 2230 at 130 °F.

Time Complete 0630 at 130 °F.

Date 2-20-73 782

Clean up work performed satisfactorily. 776

Final Wt.. S/N 007, S/N ~~008~~

Wt. 149, Wt. _____ 782

Supervisor Review M. Linenk Date 2/20/~~73~~ 73

Engineer Review [illegible] Date 2/21/73

Manufacturing & Inspection Record S/N's 009 & 010

3.0 Dia. x 8.05 Lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	1854
Shaft extension T. I. R. .020.	1854
O-rings waxed only.	1854
Mandrel cleaned properly	1854
(4) O-rings and mandrel assembled properly.	1854
Roving (S904, 12-end) installed. Lot No. FBL4.	1854
Roving tension: 1. 2 2. 2 3. 2	1854
2. Winding	
Resin mixed correctly:	1854

	Ingredient	Weight, gms.	Lot No.	
Resin	2256	700	3L27	
Catalyst	Tonox	140	3L9	1854

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1894

Throat dia. measurements:

Unit Serial No.	S/N 009	S/N 010
After (6) 90° Winding:	2.282	2.279
After cloth/90° Buildup:	2.815"	2.795"

1894

Excess resin removed without distorting winding 1894

Doublers wound correctly at each end 1894

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 1441 Time Completed 1840 2125

Date 2-15-73 2125

Cure: Time Started 1845 at 300 °F.

Time Completed 2145 at 300 °F.

Date 2-15-73 2125

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 009		S/N 010	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.146		3.145	
2.491 + .000 - .002 dia.	2.490		2.490	
1.922 + .000 - .003 dia.	1.925	1.924	1.921	1.920
2.731 + .000 - .004 dia.	2.729		2.729	
2.946 ± .010 dia.	2.944	2.945	2.947	2.946
.210 ± .005	.205		.207	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	946A	50	AGL64	4145
Catalyst	946B	7½	AGL64	4145
Thinner	ACETONE	40	AGL78	4145

Cure: Time Started 2230 at 130 °F.

Time Complete 0630 at 130 °F.

Date 2-20-73 732

Clean up work performed satisfactorily. _____

Final Wt.: S/N 009, S/N 010

Wt. 139, Wt. 133 732

Supervisor Review M Lacuse Date 2/20/73

Engineer Review [illegible] Date 2/21/73

Manufacturing & Inspection Record S/N's 011 & 012

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

Operator No.

1. Winding Preparation

Machine set up installed. 621

Shaft extension T. I. R. .019. -786

O-rings waxed only. 243

Mandrel cleaned properly 243

(4) O-rings and mandrel assembled properly. 243

Roving (S904, 12-end) installed. Lot No. AC 47. 786

Roving tension: 1. 2 1/4 2. 2 3. 2 3/4 786

2. Winding

Resin mixed correctly: 786

	Ingredient	Weight, grs.	Lot No.	
Resin	2255	530	AC 47	
Catalyst	TONOX 60-2	145	AC 9	786

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

78

Throat dia. measurements:

Unit Serial No.	S/N 011	S/N 012
After (6) 90° Winding:	2.278	2.277
After cloth/90° Buildup:	2.748	2.762

.756

Excess resin removed without distorting winding .785

Doublers wound correctly at each end .785

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 2200 Time Completed 0030 — 752

Date 2-21-73 — 752

Cure: Time Started 0045 at 270 °F.

Time Completed 0345 at 300 °F.

Date 2-21-73 — 752

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 011		S/N 012	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.148		3.144	
2.491 + .000 - .002 dia.	2.4875		2.491	
Throat Dia.-Record 1.922 + .000 - .003 dia.	1.923	1.922	1.923	1.9215
2.731 + .000 - .004 dia.	2.729		2.728	
2.946 I.D. Exit Plane-Record	2.950	2.950	2.948	2.946
.210 ± .005	.203		.205	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, grams	Lot No.	
Adhesive	946 A	100	ABL 64	7K
Catalyst	946 B	.5	ABL 64	7K
Thinner	Acetone	60	ABL 78	7K

Cure: Time Started 2-23-73 2100 at 75° °F. (INP 2-23-73)

Time Complete 2-26-73 0030 at 75° °F.

Date 2/26/73 4210

Clean up work performed satisfactorily. 4210

Final Wt.: S/N 011, S/N 012

Wt. 170 gms. Wt. 139 gms. 4210

Supervisor Review [signature] Date 4/16/73

Engineer Review [signature] Date 4/16/73

Manufacturing & Inspection Record S/N's 013 & ~~014~~

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preperation	
Machine set up installed.	786
Shaft extension T. I. R. .018.	786
O-rings waxed only.	786
Mandrel cleaned properly	786
(4) O-rings and mandrel assembled properly.	786
Roving (5904, 12-end) installed. Lot No. AR-4.	4211
Roving tension: 1. 2.5 2. 2.0 3. 2.0	786
2. Winding	
Resin mixed correctly:	4211

	Ingredient	Weight, grs.	Lot No.	
Resin	1256	500	AR-27	
Catalyst	Tonox	145	AR-1	4211

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

746

Throat dia. measurements:

Unit Serial No.	S/N 013	S/N 014
After (6) 60° Winding:	2.240	2.179
After climb/90° Buildup:	2.772	2.742	786
Excess resin removed without distorting winding			24
Doublers wound correctly at each end			745

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 2145 Time Completed 0045 — 1894

Date 2-23-73 — 1894

Cure: Time Started 0100 at 300 °F.

Time Completed 0400 at 300 °F.

RD 2-23-73

Date 2-23-73 — 1894

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 013		S/N 014 (24 hr. Time Table one)	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.148		3.147	
2.491 + .000 - .002 dia.	2.491		2.489	
Throat Dia.-Record 1.912 + .000 - .003 dia.	1.923	1.922	1.924	1.924
2.731 + .000 - .004 dia.	2.729		2.730	
2.946 I.D. Exit Plane-Record	2.953	2.948	2.958	2.954
.210 ± .005	.206		.205	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	946A	100	ABL 64	786
Catalyst	946B	15	ABL 64	786
Thinner	Acetone	80	ABL 78	786

Cure: Time Started 2-27-73 2000 at ~~75°~~ °F. 2-27-73

Time Complete 2/28/73 0030 at 75° °F.

Date 2/26/23 4210

Clean up work performed satisfactorily. 4210

Final Wt.: S/N 013, S/N ~~014~~ 015

Wt. 134 gms, Wt. _____ 4210

Supervisor Review _____ Date 2/26/73

Engineer Review _____ Date 2/26/73

Manufacturing & Inspection Record S/N's 015 & 016

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

Operator No.

1. **Winding Preparation**

Machine set up installed.	7??
Shaft extension T. I. R. .020 .	2125
O-rings waxed only.	2125
Mandrel cleaned properly	4223
(4) O-rings and mandrel assembled properly.	4223
Roving (S904, 12-end) installed. Lot No. [illegible] .	2125
Roving tension: 1. 2 2. 2 3. 2	2125

2. **Winding**

Resin mixed correctly: 4223

	Ingredient	Weight, gms.	Lot No.	
Resin	ERL2256	500	[illegible]	
Catalyst	Tonox 60/40	145	[illegible]	4223

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

786

Throat dia. measurements:

Unit Serial No.	S/N 015	S/N 016
After (6) 90° Winding:	2.282	2.281
After cloth/90° Buildup:	2.765	2.772

746

Excess resin removed without distorting winding — 744

Doublers wound correctly at each end — 755

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 2045 Time Completed 0100 1894

Date 2-28-73 1894

Cure: Time Started 0115 at 235 °F.

Time Completed 0430 at 350 °F.

Date 2-28-73 1894

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 015		S/N 016	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.146		3.1475	
2.491 + .000 - .002 dia.	2.489		2.490	
Throat Dia.-Record 1.922 + .000 - .003 dia.	1.923	1.922	1.9235	1.923
2.731 + .000 - .004 dia.	2.731		2.731	
2.946 I.D. Exit Plane-Record	2.946	2.945	2.951	2.949
.210 ± .005	.211		.210	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	946 A	50	ABL-64	832
Catalyst	946 B	7½	ABL-64	832
Thinner	ACETONE	40	ABL-78	832

Cure: Time Started 1545 at 134 °F.

Time Complete 2300 at 140 °F.

Date 3/6/23 669

Clean up work performed satisfactorily. 3924

Final Wt.: S/N 015, S/N 016

Wt. 141, Wt. 144 782

Supervisor Review C. C. Beach Date 3/6/23

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 017 & 018

3.0 Dia. x 8.0± lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	324
Shaft extension T. I. R. 1.120.	786
O-rings waxed only.	669
Mandrel cleaned properly	669
(4) O-rings and mandrel assembled properly.	669
Roving (S904, 12-end) installed. Lot No. 10C 4 15	746
Roving tension: 1. 2 2. 2 3. 2	746
2. Winding	
Resin mixed correctly:	786

	Ingredient	Weight, grs.	Lot No.	
Resin	922.6	232.5	10C 27	
Catalyst	3-4 diglic	145	10C 8	746

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

7 86

Throat dia. measurements:

Unit Serial No.	S/N 017	S/N 018
After (6) 90° Winding:	2.274	2.272
After cloth/90° Buildup:	2.760	2.766

7 46

Excess resin removed without distorting winding — 7 46

Doublers wound correctly at each end — 1 87 1

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 0100 Time Completed 0500 — 1852

Date 2-28-73 — 1894

Cure: Time Started 0430 at 300 °F.

Time Completed 0730 at 300 °F.

Date 2-28-73 — 1894

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 017		S/N 018	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.147		3.1455	
2.491 + .000 - .002 dia.	2.490		2.4895	
Throat Dia.-Record 1.922 + .000 - .003 dia.	1.923	1.9225	1.9245	1.9245 — 1147
2.731 + .000 - .004 dia.	2.727		2.7275	
2.946 I.D. Exit Plane-Record	2.947	2.945	2.943	2.942
.210 ± .005	.207		.205	

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, ms.	Lot No.	
Adhesive	946 A	50	ABL-64	832
Catalyst	946 B	2½	ABL-64	832
Thinner	ACETONE	40	ABL-78	832

Cure: Time Started 1545 at 134 °F.

Time Complete 2345 at 140 °F.

Date 3/4/73 669

Clean up work performed satisfactorily. 3924

Final Wt.: S/N 017, S/N 018

Wt. 135, Wt. 136 752

Supervisor Review O.A. Bennett Date 3/5/73

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 019 & 020

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	226
Shaft extension T. I. R. .025.	226
O-rings waxed only.	226
Mandrel cleaned properly	226
4) O-rings and mandrel assembled properly.	226
Roving (S904, 12-end) installed. Lot No. AR15.	226
Roving tension: 1. 2 2. 1½ 3. 2	226
2. Winding	
Resin mixed correctly:	226

	Ingredient	Weight, lbs.	Lot No.	
Resin	2256	100	AB427	
Catalyst	Tonox	29	AB38	226

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2125

Throat dia. measurements:

Unit Serial No.	S/N 019	S/N 020
After (6) 90° Winding:	2.275	2.272
After cloth/90° Buildup:	2.750	2.750

2125

Excess resin removed without distorting winding 2125

Doublers wound correctly at each end 2125

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 1500 Time Completed 1830 786

Date 3-2-73 786

Cure: Time Started 1900 at 285 °F.

Time Completed 2200 at 300 °F.

Date 3-2-73 786

4. Machining and Sectioning

Parameter	Actuals			
Unit Identification	S/N 019		S/N 020	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.145		3.149	
2.491 + .000 - .002 dia.	2.490		2.490	
Throat Dia.-Record 1.922 + .000 - .[illegible] dia.	1.922	1.921	1.924	1.923
2.731 + .000 - .004 dia.	2.729	2.725	2.729	2.7285
2.946 I.D. Exit Plane-Record	2.950	2.940	2.944	2.943
.210 ± .005	.211		.210	

1147

Operator No.

5. **Finishing**

Coating mixed correctly:

	Ingredient	Weight, ms.	Lot No.	
Adhesive	Epon 828	50.0	081-60	782
Catalyst	Epi-Cure	7.5	086-60	782
Thinner	Acetone	40.0	082-78	782

Cure: Time Started 1430 at 130 °F.

Time Complete 0030 at 130 °F.

Date 3/6/73 776

Clean up work performed satisfactorily. 3924

Final Wt.: S/N 019, S/N 020

Wt. 136 GRAMS. Wt. 135 GRAMS 880 - 421

Supervisor Review [signature] Date 3/7/73

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 021 & 022

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	3970
Shaft extension T. I. R. .027.	786
O-rings waxed only.	786
Mandrel cleaned properly	786
(4) O-rings and mandrel assembled properly.	786
Roving (S904, 12-end) installed. Lot No. LRC 5.	786
Roving tension: 1. 2¼ 2. 2¼ 3. 2	786
2. Winding	
Resin mixed correctly:	786

	Ingredient	Weight, ozs.	Lot No.	
Resin	2256	520	LRC 27	
Catalyst	Tonox 60/40	145	LRC 8	786

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

TAG

Throat dia. measurements:

Unit Serial No.	S/N 021	S/N 022
After (4) 90° Winding:	2.271	2.273
After cloth/90° Buildup:	2.755	2.760

TAG

Excess resin removed without distorting winding — TAG

Doublers wound correctly at each end — TAG

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 1545 Time Completed 1915 — 252

Date 3-5-73 — 782

Cure: Time Started 1930 at 255 °F.

Time Completed 2230 at 300 °F.

Date 3-5-73 — 782

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 021		S/N 022	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.147		3.148	
2.491 + .000 - .002 dia.	2.490		2.490	
Throat Dia.-Record 1.922 + .000 - .033 dia.	1.925	1.923	1.925	1.923
2.731 + .000 - .004 dia.	2.728		2.728	
2.946 I.D. Exit Plane-Record	2.951	2.949	2.952	2.954
.210 ± .005	.210		.208	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	941 PART-A	50 gms	ABL-66	425
Catalyst	941 PART-B	7½ gms	ABL-66	4125
Thinner	ACETONE	40 gms	ABL-78 JH 3-29-23	4125

Cure: Time Started 0150 at 1300 °F.

Time Complete 1100 at 130 °F.

Date 3-29-23 782

Clean up work performed satisfactorily. 782

Final Wt.: S/N 021, S/N 022

Wt. 140 Gms, Wt. 139 Gms 782

Supervisor Review [signature] Date 4/6/23

Engineer Review [signature] Date 4/6/23

Manufacturing & Inspection Record S/N's 023 & 024

3.0 Dia. x 8.05 lc. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	370
Shaft extension T. I. R. .013.	184
O-rings waxed only.	184
Mandrel cleaned properly	184
(4) O-rings and mandrel assembled properly.	184
Roving (S994, 12-end) installed. Lot No. AM 5.	184
Roving tension: 1. 2 lb 2. 2 3. 2	184
2. Winding	
Resin mixed correctly:	184

	Ingredient	Weight, gm.	Lot No.	
Resin	2256	100	AM 21	
Catalyst	Lucidol	2.5	HAL 9	184

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

4/69

Throat dia. measurements:

Unit Serial No.	S/N 023	S/N 024
After (6) 90° Winding:	2.269	2.275
After Cloth/90° Buildup:	2.250	2.248

4/69

Excess resin removed without distorting winding 4/69

Doublers wound correctly at each end 4/69

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 2140 Time Completed 2170 — 746

Date 3-21-73 — 746

Cure: Time Started 0145 at 285 °F.

Time Completed 0445 at 300 °F.

Date 3-21-73 — 746

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 023		S/N 024	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.148		3.147	
2.691 + .000 - .002 dia.	2.490		2.490	
Throat Dia.-Record 1.922 + .000 - .003 dia.	1.9235	1.9225	1.9235	1.923
2.731 + .000 - .004 dia.	2.729		2.728	
2.945 I.D. Exit Plane-Record	2.948	2.947	2.947	2.947
.210 ± .005	.209		.215	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, ms.	Lot No.	
Adhesive	9W-CRI-A	50 gms	ABL-16	4129
Catalyst	9W-ABAI-B	7½ gms	ABL-66	4128
Thinner	ACETONE	40 gms	ABL-78	4129

5-29-73

Cure: Time Started 0730 at 130 °F.

Time Complete 1100 at 130 °F.

Date 5-29-73 782

Clean up work performed satisfactorily. 982

Final Wt.: S/N 023, S/N 024

Wt. 137 Gms. Wt. 141 Gms 782

Supervisor Review [signature] Date 5/30/73

Engineer Review [signature] Date 5/30/73

Manufacturing & Inspection Record S/N's 025 & 026

3.0 Dia. x 8.05 Lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	[illegible]
Shaft extension T. I. R. .014.	[illegible]
O-rings waxed only.	[illegible]
Mandrel cleaned properly	[illegible]
(4) O-rings and mandrel assembled properly.	[illegible]
Roving (S904, 12-end) installed. Lot No. [illegible].	[illegible]
Roving tension: 1. [illegible] 2. [illegible] 3. [illegible]	[illegible]
2. Winding	
Resin mixed correctly:	[illegible]

	Ingredient	Weight, lbs.	Lot No.	
Resin	[illegible]	[illegible]	[illegible]	
Catalyst	[illegible]	[illegible]	[illegible]	[illegible]

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	–	✓	–	–	✓	–	✓	✓	–	–	–	–	–	–

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	–	–	–	–	.	–	–	–	–	–	–

1114

Throat dia. measurements:

Unit Serial No	S/N 025	S/N 026
After (6) 90° Winding:	2.225	2.266
After cloth/90° Buildup:	2.235	2.265

1121

Excess resin removed without distorting winding ✓

Doublers wound correctly at each end ✓

832

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 0930 Time Completed 1240 4168

Date 4-4-73 4168

Cure: Time Started 1250 at 300 °F.

Time Completed 1535 at 300 °F.

Date 4/4/73 4168

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 025		S/N 026	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.147		3.146	
2.491 + .000 - .002 dia.	2.490		2.491	
Throat Dia.-Record 1.922 + .000 - .003 dia.	1.9235	1.923	1.923	1.9225
2.731 + .000 - .004 dia.	2.729		2.729	
2.946 I.D. Exit Plane-Record	2.942	2.941	2.941	2.940
.210 ± .005	.209		.210	

1147

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	946 A	60	ABL60	4168
Catalyst	946 B	7½	ABL68	4168
Thinner	ACETONE	40	ABL69	4168

Cure: Time Started 1300 9/5/73 at 130 °F.

Time Complete 2100 at 130 °F.

Date 9-5-73 393

Clean up work performed satisfactorily. 669

Final Wt.: S/N 025, S/N 026

Wt. 1328 gms, Wt. 1413 gms 669

Supervisor Review [signature] Date 9-5-73

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 027 & 028

3.0 Dia. x 8.05 lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	776
Shaft extension T. I. R. .0034.	776
O-rings waxed only.	4211
Mandrel cleaned properly	4211
(4) O-rings and mandrel assembled properly.	4211
Roving (S994, 12-end) installed. Lot No. AB/ 5.	786
Roving tension: 1. 2# 2. 2# 3. 2#	421
2. Winding	
Resin mixed correctly:	286

	Ingredient	Weight, grs.	Lot No.	
Resin	826	100	AB437	
Catalyst	Tonox 60/40	20	AB-9	286

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	-	-	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-	-	-	-	-	-	-	-	-	-	-	-

4211
1654

Throat dia. measurements:

Unit Serial No.	S/N 027	S/N 028
After (6) 90° Winding:	2.275	2.216
After cloth/90° Buildup:	2.760	2.750

1654

Excess resin removed without distorting winding 1654

Doublers wound correctly at each end 1654

3. B-Stage and Cure — Operator No.

B-Stage: Time Started 0330 Time Completed 0630 1171

Date 4.5.73 1884

Cure: Time Started 0645 at 285 °F.

Time Completed 745 at 300 °F.

Date 4/5/73 4168

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 027		S/N 028	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.150	3.149	3.150	3.1488
2.491 + .000 - .002 dia.	2.491	2.491	2.491	2.4899
Throat Dia.-Record 1.922 + .000 - .003 dia.	1.922	1.921	1.924	1.924
2.731 + .000 - .004 dia.	2.731	2.731	2731	2.7305
2.946 I.D. Exit Plane-Record	2.946	2.946	2.947	2.945
.210 ± .005	.210	.210	.210	.210

4006A

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	EA 946 A	40	BAL60	4210
Catalyst	EA 946 B	7½	BBL60	4210
Thinner	[illegible]	4C	BBL58	4210

Cure: Time Started [illegible] 4/19/73 at [illegible] °F.

Time Complete [illegible] 4/20/73 at 75° °F.

Date 4-24-73 2125

Clean up work performed satisfactorily. 2125

Final Wt.: S/N 027, S/N 028

Wt. 138.9 gms. Wt. 139.1 gms. 2125

Supervisor Review M Lessue Date 4/24/73

Engineer Review _____ Date _____

Manufacturing & Inspection Record S/N's 029 & 030

3.0 Dia. x 8.05 Lg. Motor Case

Glass Nozzle Fabrication

Dwg. 720608-2

	Operator No.
1. Winding Preparation	
Machine set up installed.	776
Shaft extension T. I. R. .004.	776
O-rings waxed only.	4211
Mandrel cleaned properly	4211
(4) O-rings and mandrel assembled properly.	4211
Roving (S904, 12-end) installed. Lot No. ABC 5.	4211
Roving tension: 1. 2# 2. 2# 3. 2#	4211
2. Winding	
Resin mixed correctly:	4211

Ingredient	Weight, gms.	Lot No.	
Resin	3256	700	27	
Catalyst	Tonox	29	9	4211

Operator

2. Winding (cont.)

Sequence check off:

X	X	X	X	0	0	0	0	0	0	C1	C2	0	C3	C4	0	C5	C6	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C7	C8	0	C9	C10	0	C11	C12	0	C13	C14	0
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

4211
4211

Throat dia. measurements:

Unit Serial No.	S/N 029	S/N 030	
After (6) 90° Winding:	2.279	2.279	
After cloth/90° Buildup:	2.779	2.761	4211
Excess resin removed without distorting winding			26
Doublers wound correctly at each end			1871

3. B-Stage and Cure

Operator No.

B-Stage: Time Started 0045 Time Completed 0500 782

Date 4-6-73 782

Cure: Time Started 0515 at 290 °F.

Time Completed 0815 at 290 °F.

Date 4-6-73 832

4. Machining and Stripping

Parameter	Actuals			
Unit Identification	S/N 029		S/N 030	
Dimensions Measured	Max.	Min.	Max.	Min.
3.150 + .000 - .010 dia.	3.150	3.1495	3.149	3.1485
2.491 + .000 - .002 dia.	2.491	2.4905	2.491	2.4905
Throat Dia.-Record 1.922 + .000 - .003 dia.	1.922	1.9215	1.922	1.9215
2.731 + .000 - .004 dia.	2.731	2.731	2.731	2.731
2.946 I.D. Exit Plane-Record	2.946	2.945	2.947	2.946
.210 ± .005	.210	.210	.210	.210

U0064

Operator No.

5. Finishing

Coating mixed correctly:

	Ingredient	Weight, gms.	Lot No.	
Adhesive	[illegible]	50	[illegible]	[illegible]
Catalyst	[illegible]	7 1/2	[illegible]	[illegible]
Thinner	[illegible]	40	[illegible]	[illegible]

Cure: Time Started [illegible] 4/19/73 at 75 °F.

Time Complete 0230 4/20/73 at 75 °F.

Date 4-20-73 2125

Clean up work performed satisfactorily. 2125

Final Wt.: S/N 029, S/N 030

Wt. 142.3 gms. Wt. 139.2 gms 2125

Supervisor Review M. Lemire Date 4/24/73

Engineer Review _____ Date _____